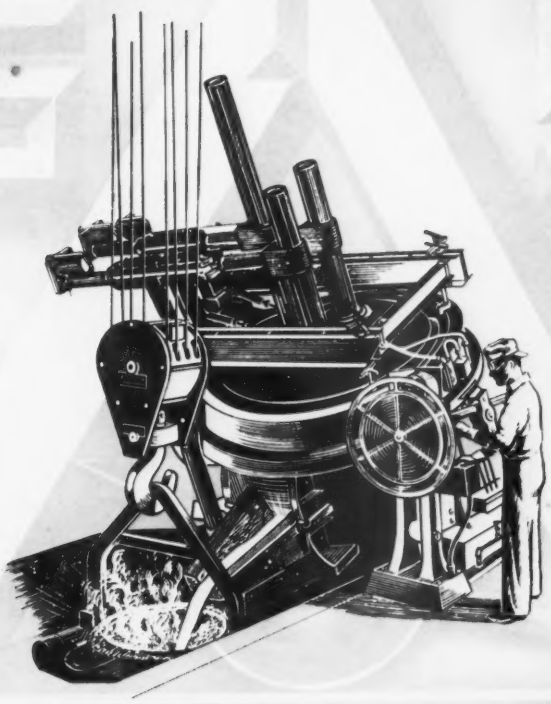
TECHNOLOGY DEPT.

MARCH 1952

FOUNDRY



Steel Founders' Society 50th Anniversary

TO CUT CASTING LOSSES

use

in every melt

Every day, more leading foundries are using Purite *regularly* to cut casting losses and increase production of finished work. In these foundries, the use of Purite is standard operational procedure in every cupola charge. In the ladle too, Purite helps keep production high.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. **Purite produces a higher percentage of finished castings per ton of metal poured.**
2. **Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.**
3. **Purite gets to all the iron quicker.**
4. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
5. **Purite comes in 2-lb. pigs—no weighing or measuring required.**
6. **Purite is 100% pure fused soda ash—you do not pay for inert materials.**
7. **Purite does not crumble—no waste—no dust.**
8. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

Purite, the scientific flux for better melting and cleaner iron, is sold by all leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

Large spur gear on calendar drive in pulp and paper mill, now specified in Ductile Iron, replacing carbon steel.

DUCTILE IRON

Proves Its Stamina in Machinery Gears

Black-Clawson Company of Hamilton, Ohio, reports several advantages obtained in their production of paper mill and allied equipment by replacing alloy gear castings and forgings with parts made from Ductile Iron.

The gear, illustrated, is typical of these Ductile Iron castings.

Not only has Black-Clawson saved critical materials by using Ductile Iron, but the ease of fabricating contributes to the maintenance of production schedules.

Black-Clawson foundries now produce Ductile Iron in five basic grades for castings that range from less than a pound to more than 7½ tons in weight. Tensile strengths up to 216,000 p.s.i., and hardness that exceeds 400 BHN, may be attained by heat treating Ductile Iron. This company also successfully welds Ductile Iron to steel, to stainless steel, and to itself.

Ductile Iron applications include as-cast and heat treated components for industrial, automotive and agricultural equipment. Also, for railway and other heavy industrial equipment, as well as that used in textile, electrical, marine and other fields too numerous to list.

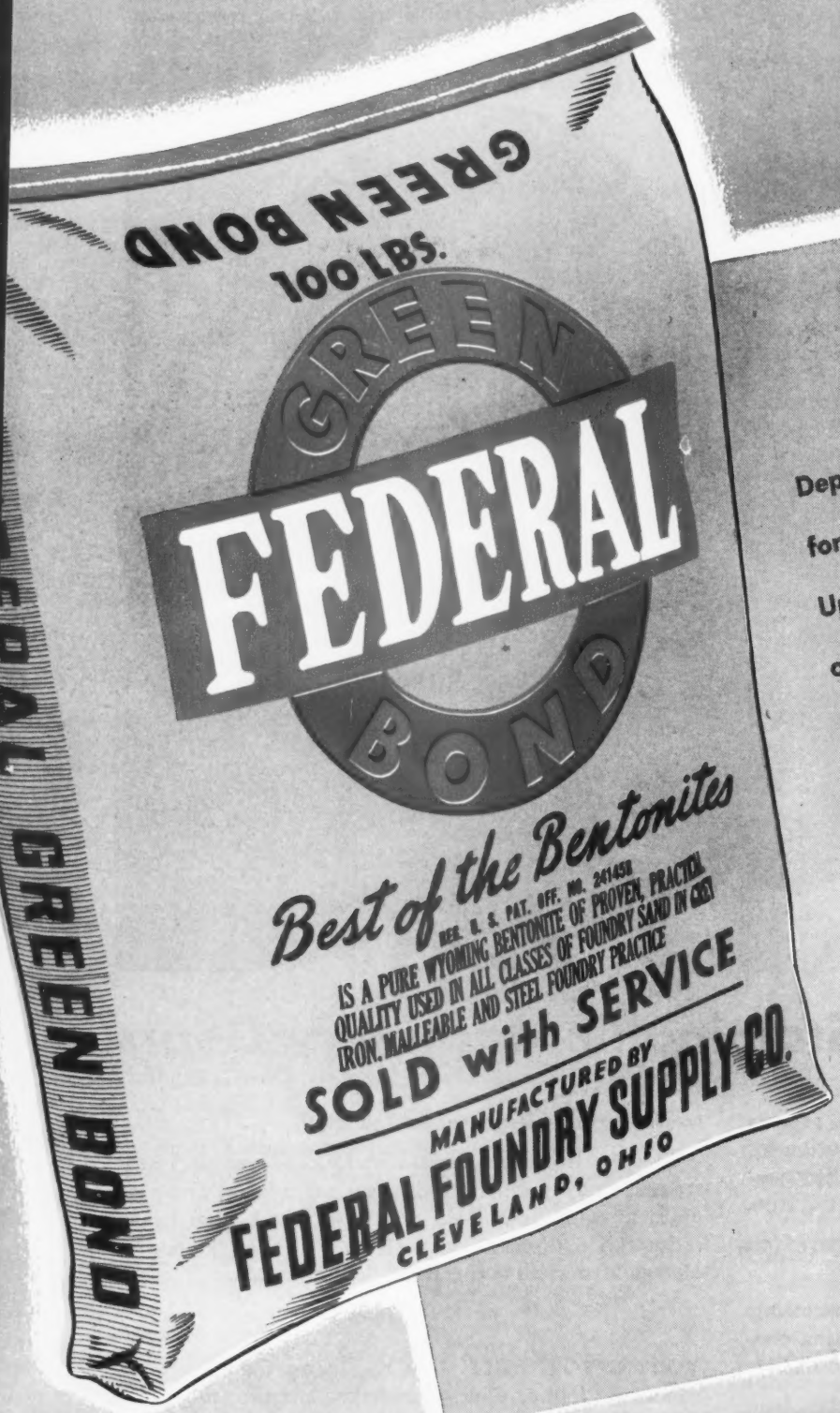
* * *

YOUR OPPORTUNITY: Join the increasing number of successful foundries now producing Ductile Iron. Write for additional information on the production advantages and types of castings for which Ductile Iron has been adopted.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

STILL THE *Best* OF THE BENTONITES!


GREEN BOND
100 LBS.
GREEN
FEDERAL
BOND
Best of the Bentonites
REG. U. S. PAT. OFF. NO. 241450
IS A PURE WYOMING BENTONITE OF PROVEN, PRACTICAL QUALITY USED IN ALL CLASSES OF FOUNDRY SAND IN GREY IRON, MALLEABLE AND STEEL FOUNDRY PRACTICE
SOLD with SERVICE
MANUFACTURED BY
FEDERAL FOUNDRY SUPPLY CO.
CLEVELAND, OHIO
GREEN BOND

Deposits of the finest Bentonite clay for foundry use are located near Upton, Wyoming. Here, on Federal-owned property, GREEN BOND is mined, dried and pulverized, to produce bonding clay of the finest quality and uniformity. From the very beginning, GREEN BOND has been the best of the Bentonites!

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CANADA—Overseas Commodities Ltd., 2845 Grandview Hgy., Vancouver, B.C. • T. D. Barnes, 59 Sun Life Bldg., Hamilton, Ont. • Newman Foundry Supply, Ltd., 643 St. Paul St. W., Montreal, Que. European Concessionaires: The District Chemical Company, Ltd., 1-19 New Oxford St., London W. C. 1, England.

MARCH 1952

FOUNDRY

VOLUME 80—NUMBER 3

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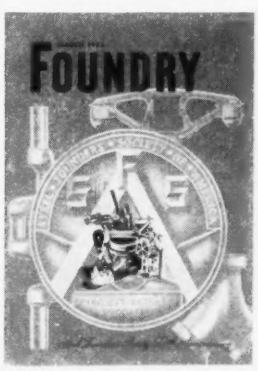

THE COVER: Typical steel castings and the electric furnace call attention to the fiftieth anniversary of the Steel Founders' Society of America (see page 86)

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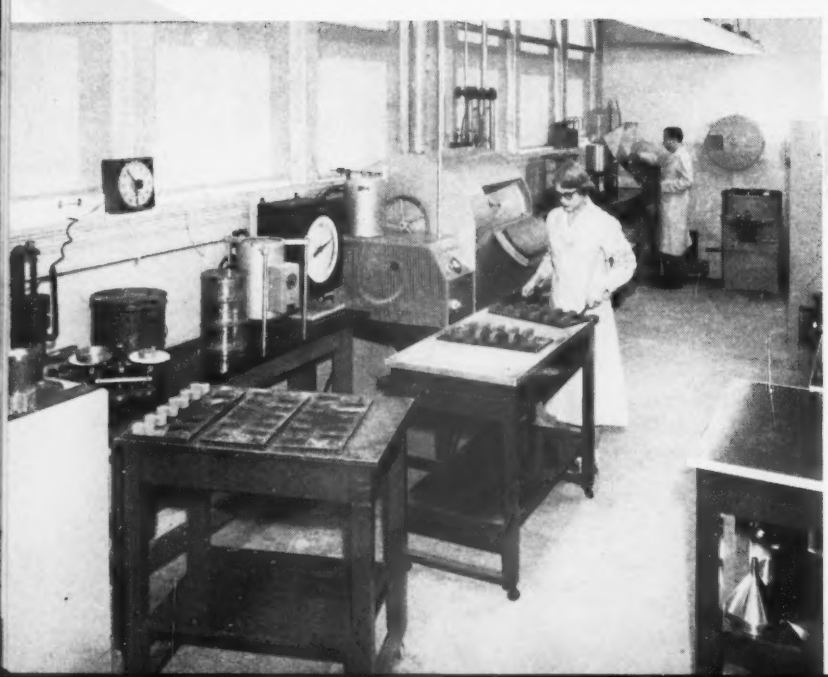
LINOIL

CORE OILS

PRODUCE

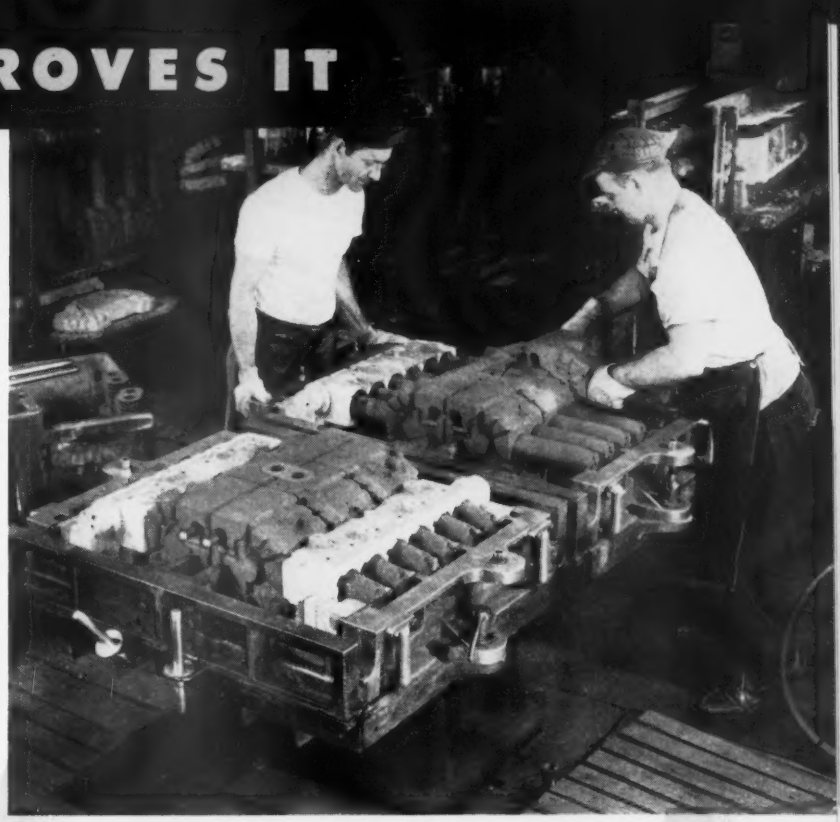
Better Cores at Lower Cost

WE PROVE IT



Linoil Research continually examines and evaluates new materials for use in improving core binders. When a material looks promising, it is sent to ARCHER-DANIELS-MIDLAND Sand Laboratories for a thorough observation in all core properties, permeability, flowability, green and baked strength, collapsibility, and many others. Once the new grade of LINOIL has been developed, manufacturing control laboratories in each of the three LINOIL plants make certain that chemical and physical specifications are never varied. No matter what grade of LINOIL you specify, you are assured consistent performance from the best core oil you can buy.

STUDEBAKER PROVES IT



Many automotive foundrymen consider the core room to be the most important department in the foundry. Cores aren't responsible for all the problems of the molding and cleaning departments; but a smoothly operating core room does mean far fewer headaches in the rest of the shop.

Like most automotive foundries, Studebaker uses LINOIL. They find that LINOIL gives them good, useable cores at a low cost. And they know that once careful controls are established on any core job, LINOIL can be depended upon to give uniform results.

YOU CAN PROVE IT

Ask your LINOIL representative to give a demonstration with your core work right in your own foundry. He'll select the grade of LINOIL that's best for your condition, then show you how your cores can be made to do a better job at a lower cost, with LINOIL core oils. And if you've got a particular core problem that's hard to solve, he'll be glad to help you work it out.

Have you heard about the New LINOIL 700 Core Oils?

Here are the facts: No matter what core oil you are now using, you can replace it with one of the newly-developed LINOIL 700 Series and get greater tensile strengths *at a lower cost.* The LINOIL 700 core oils are easy to work with, too. They're proving to be the best core oil buy in the history of the foundry industry. Ask your LINOIL man about the "700 Series"—or write for further information.

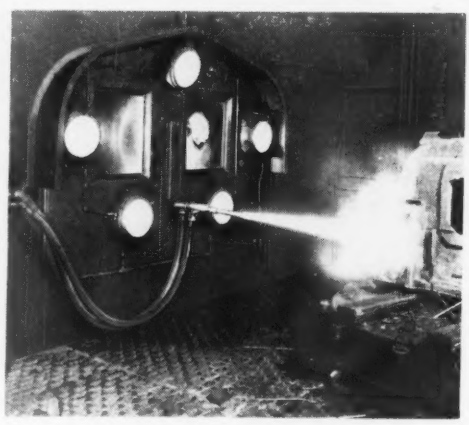
ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th STREET • CLEVELAND 2, OHIO

Do jobs like this in 15 minutes with Pangborn Hydro-Sand Blast!

AFTER

BEFORE



These photos were taken of the same casting 15 minutes apart . . . before and after it underwent core knockout and blast cleaning *in one operation* in a Pangborn Hydro-Sand Blast Room.

This modern installation propels a high-velocity stream of sand and water that blasts, cuts and cleans. Work rotates on a controllable table inside the steel room while the operator manipulates the blast stream from outside. There's no dirt or dust. It's a cleaning room that *keeps itself clean* . . . reducing dust in other working areas.

With this Pangborn Hydro-Sand Blast Room, you recover core and reclaim core rods *without* sledge damage. Your subsequent roughing and chipping operations become faster, cheaper jobs because of the thoroughness and efficiency of this remarkable machine. It's custom-built to meet your requirements.

Write for information-packed, fully illustrated bulletin No. 1100 on Hydro-Sand Blast Room. PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

ADVERTISEMENT

If you haven't heard it . . . IT'S NEWS!

SINCE THE ADVENT OF THE AUTO mankind is being divided into two groups: the quick and the dead.

* * *

ONE OF THE BIG OPTICAL COMPANIES recently developed a pair of field glasses so powerful and perfect they make seeing a football game from the stadium almost as good as on television.

* * *

A MAN COULD RETIRE COMFORTABLY in his old age if he could only dispose of his experience for what it cost him.

* * *

FROM THE TIME SHE'S 14 until she reaches 60, the average American woman uses 3 times her weight in cosmetics. Or to put it another way, she applies eight pounds of assorted creams, gooks, greases and war paint per year.

* * *

EXECUTIVE ABILITY IS THE ART OF CONVINCING YOUR WIFE that you hired your pretty secretary on account of her experience.

* * *

DON'T FEEL TOO BAD ABOUT GROWING OLD—especially these days when so many American motorists are denied the privilege.

* * *

IF FIVE BILLION DOLLARS were to disappear into thin air it would certainly be news. But according to the N. Y. Journal of Commerce, just the reverse is true: that much money is the annual cost (in the U. S.) of air being polluted by smoke and fumes.

* * *

INDUSTRIAL DUST IS COSTLY, TOO. Even dusty light bulbs in your foundry can raise your electric light bill by 20%. And this is a drop in the bucket compared to other losses caused by dust—discomfort for workers, costly housekeeping, damage to machinery, and many others. Pangborn Dust Control can solve this perennial problem for foundries with surprising savings. For details write Pangborn Corporation, 1400 Pangborn Blvd., Hagerstown, Md.

* * *

NO DOUBT the words "In God We Trust" were placed on pennies for the benefit of those who use them for fuses.

* * *

WHENEVER YOU GET TO FEELING TOO SELF-SATISFIED, consider the anatomy of a human being: in designing man's hinges, the Creator knew he would have little occasion to pat himself on the back.

* * *

AMERICA IS STILL THE LAND OF OPPORTUNITY where a man can start out digging ditches and wind up behind a desk—if he doesn't mind the financial sacrifice.

GRINDING COSTS SLASHED 30% after cleaning with Pangborn ROTOBLAST®

Pangborn Table loadings up to 1500 lbs. are blast cleaned in 4 minutes at Jardine.

Bronze castings, before and after cleaning with Rotoblast, show amazing efficiency of the Pangborn Table-Room.

At the
Jardine Bronze Foundry
Baldwinsville, N. Y.

Castings for milk bottling machines . . . tanks and submarines . . . air conditioning and refrigeration equipment . . . and lots more! The Jardine Bronze Foundry cleans them all efficiently in a Pangborn ROTOBLAST® Table-Room!

Jardine originally purchased its Pangborn Table-Room to speed up production. Once in use, the Table-Room more than proved its worth by slashing grinding operation costs 30% . . . due to the amazing efficiency of the blast cleaning job!

Find out how you can speed production *and save money too!* There's a modern, economical, efficient ROTOBLAST *Barrel, Room, Table* or *Table-Room* especially designed to solve every blast cleaning problem . . . including yours! For the complete facts, write today for Bulletin 214. Address: PANGBORN CORP., 1400 Pangborn Boulevard, Hagerstown, Maryland.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Jardine Reports:

- Cleaning efficiency makes possible 30% savings in grinding operations!
- Efficient operation with table loadings of 1500 lbs.!
- Blasting for just 4 minutes does the job!

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

ROTOBLAST . . .

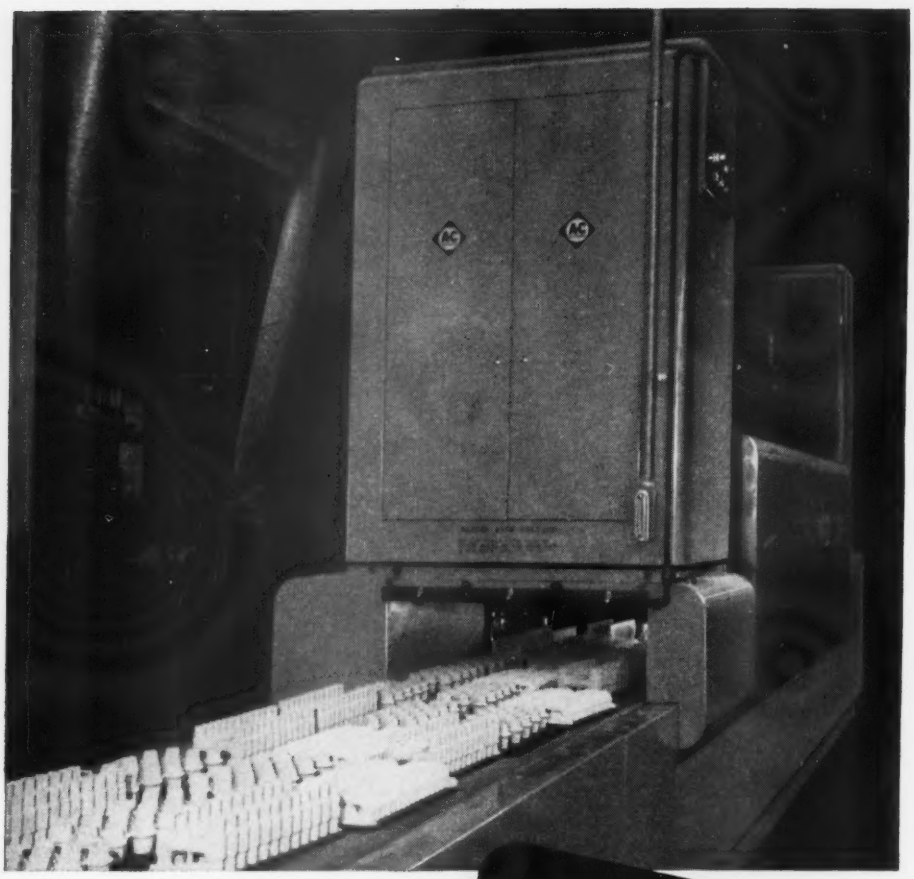
SAVES LABOR with push-button operation

SAVES SPACE because machines are compact

SAVES TIME by cleaning more loads per day

SAVES POWER since no compressor is needed

SAVES TOOLS because all scale is removed



FOUNDROMATIC *Dielectric* SAND CORE DRYER

WHY PAY A Premium for Cores?

CUT CORE COSTS to the bone with reductions like these:

- Reduce high handling costs 60-80%! Cores need only be moved twice: once to the dryer and then to the molder. No collecting, cooling, or storage handling required.
- Cut long drying cycles by 80%! Cores are dried in minutes instead of hours.
- Cut high fuel bills 60%! All the heat goes into the core. Best of all, short warm-up time permits turning off unit when not in use.
- Reduce your reject pile. Overbaking of cores and burning of fins and thin sections is eliminated.
- Put those big core storage spaces into production space. Make cores as you need them.

The amazing thing is that these are not the only benefits. There are advantages in shakeout, improvements in core and casting quality, and improvements in working conditions.

We urge you to investigate this revolutionary development in core making.

Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3596

Foundromatic is an Allis-Chalmers trademark.

THE CORE BOX

Questions and Answers About Dielectric Sand Core Drying

1. Is any special or additional equipment needed when using a dielectric sand core dryer?

None, except plastic dryers to hold shaped cores. Marinite, transite, or plywood plates are recommended.

2. Can you use metal dryers or plates?

You can, but it will result in reduced production. The metal will act as a shield around the sand, requiring the core to be run a second time without the dryer or plate.

3. How many plastic dryers will be needed?

Far less than the normal amount of metal dryers. A maximum of 50 plastic dryers should suffice for each job unless more than one coremaker is working on the same job.

4. Can core rods or nails be used to help support cores?

Yes. For best results, rods or nails should be parallel to electrodes. If it is necessary to place rods or nails vertically in the core, they should be of minimum size in relation to core mass and should not protrude through surface of sand.

5. Will light sections burn if dried with heavy sections?

No. Cores will not burn in the *Foundromatic* core dryer.

6. What about moisture pick-up by stored cores?

Moisture pickup should be no more than with oil sand. Proper cure will produce a core that is practically impervious to moisture. Excessive amounts of cereal will contribute to moisture pickup. The big advantage is that production can be arranged to require a minimum storage of cores when *Foundromatic* dryers are used.

7. Can I add materials to increase hot strength?

Yes. Iron oxide, silica flour or Bentonite may be added to core mix, but will reduce the production as these materials naturally close the sand up, retarding the escape of moisture.

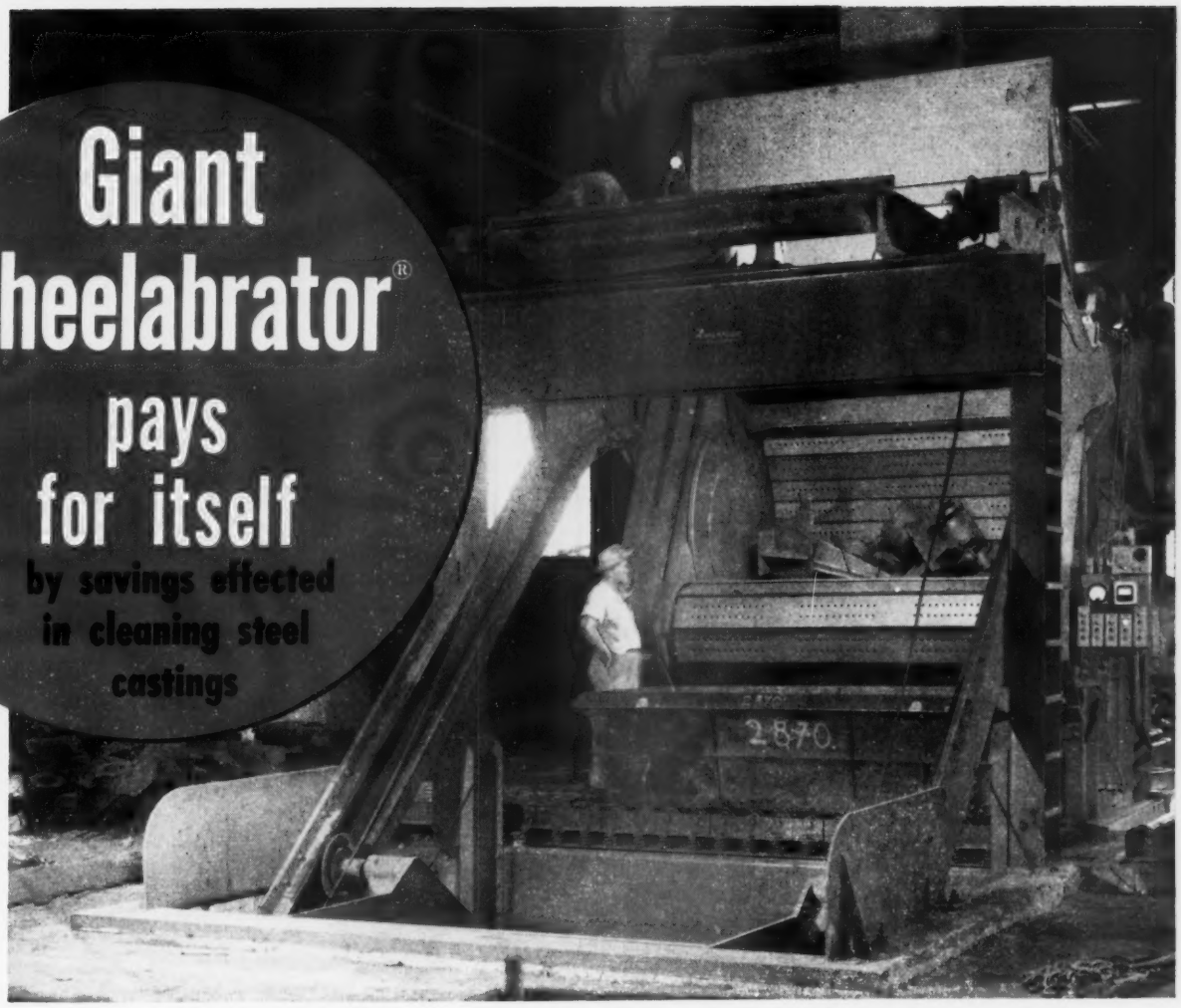
8. Is equipment safe from the standpoint of burns or shock?

Yes. Access doors are interlocked to shut off all power when opened.

ALLIS-CHALMERS

Giant Wheelabrator® pays for itself

by savings effected in cleaning steel castings

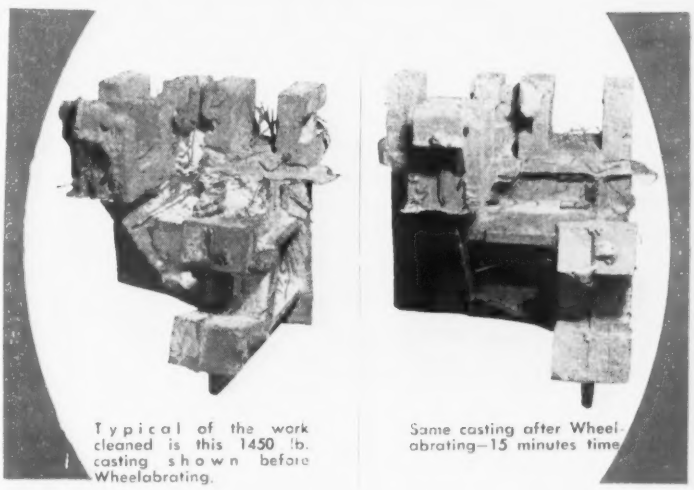


for BIRDSBORO STEEL FOUNDRY and MACHINE CO. *Birdsboro, Pa.*

Savings effected by a 63 cu. ft. capacity airless Wheelabrator Tumblast were sufficient to amortize the entire investment in record time. Cleaning 2 to 3 ton loads of miscellaneous steel castings in just 15 minutes, the giant machine handles 25% more tonnage than was formerly achieved by two air blast table rooms. Daily man-hour requirements have been slashed from 54 to only 11.

Drastic time-and-cost reductions are not the only advantages Birdsboro has realized. Mr. A. L. Wentzel, Works Manager, sums it up this way: "The fact that our castings are cleaned much better reduces chipping and grinding time and gives us an improved customer satisfaction. On every score the Wheelabrator has been an excellent investment."

Like to duplicate this story? Why not have a Wheelabrator engineer survey your cleaning requirements for similar cost-cutting results. Write for information today.



Typical of the work cleaned is this 1450 lb. casting shown before Wheelabrating.

Same casting after Wheelabrating—15 minutes time

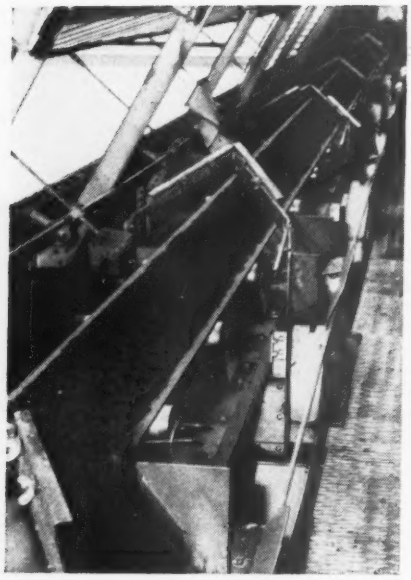
American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka 2, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST CLEANING EQUIPMENT

D3237



How Landis Tool reduced costs on sand conveying

■ The belt pictured here is one of six Standard Sahara distributor belts in service at Landis Tool Co., Waynesboro, Pa., manufacturers of precision cylindrical grinding machines. Installed December 12, 1946, this belt is still good for several years of service. Landis reports these belts handle sand at lower cost than any belts they have ever used.

Trouble-free Service

Imperial's Standard Sahara Belts are built for trouble-free service. Base fabric is heavy, tight-woven 37½-ounce silver duck — double-stitched to positively prevent ply separation. Special impregnation preserves and waterproofs the belt, increases its resistance to abrasion, and gives the belt pliability.

Other Foundry Uses

Standard Sahara Belts are also widely used in foundry service for handling hot shakeout sand, as magnetic separator belts, and for conveying hot core sand. Other Imperial belts will handle hot materials up to 600°.

Tell us your problem and we'll give you our recommendations. Write for Data Sheet 47-8.

Imperial
BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.

With the EDITORS

IS It Legal? According to reports in the daily press, Tell Berna, general manager, National Machine Tool Builders' Association, recently took a swing at the confusion in defense regulations due to the gobbledygook of government lawyers. He pointed out that while most ideas are clear and understandable when they leave the top level, by the time the legal department makes certain no federal law is being violated, the resulting regulation is so full of double negatives and long, rambling sentences, that it only confuses the average business man.

It was ever thus. Back in the fall of 1941, the editor was chief of a section in the Office of Production Management, predecessor of the War Production Board. In that capacity he prepared the draft of an order governing the delivery of foundry equipment and supplies under priority controls. This draft went to the legal department, and the bright young boys, under compulsion from the higher-ups, rewrote the order seven times before it finally was issued. And then, believe it or not, they used the original draft as the interpretation of the order.

In their effort to hold every action within the confines of law (as interpreted by the legal department) the lawyers did more to delay industrial mobilization in World War II than any other group.

—o—

Helping Hands: Since 1949, the Economic Cooperation Administration, now the Mutual Security Agency, has been bringing teams of European technicians and specialists to the United States to study our production methods and to learn more of our way of life. ECA also has sent technical information and American experts to Europe to assist in increasing productivity. Many American companies have assisted in this program by permitting the visitors to study plant operations, or by providing technical information for distribution abroad. Recently these helping hands have been recognized by ECA in the awarding of a "Certificate of Cooperation" to the individual companies for "furnishing technical assistance to the people of Marshall Plan countries to aid them in maintaining individual liberty, free institutions and peace." FOUNDRY is honored to be included in this distinguished group of companies.

THE ECONOMIC COOPERATION ADMINISTRATION

CERTIFICATE OF COOPERATION

awarded to

The Penton Publishing Company, Publishers of Foundry

for furnishing technical assistance to the Peoples of the Marshall Plan Countries to aid them in maintaining individual liberty, free institutions and peace.

December 29, 1951

—o—

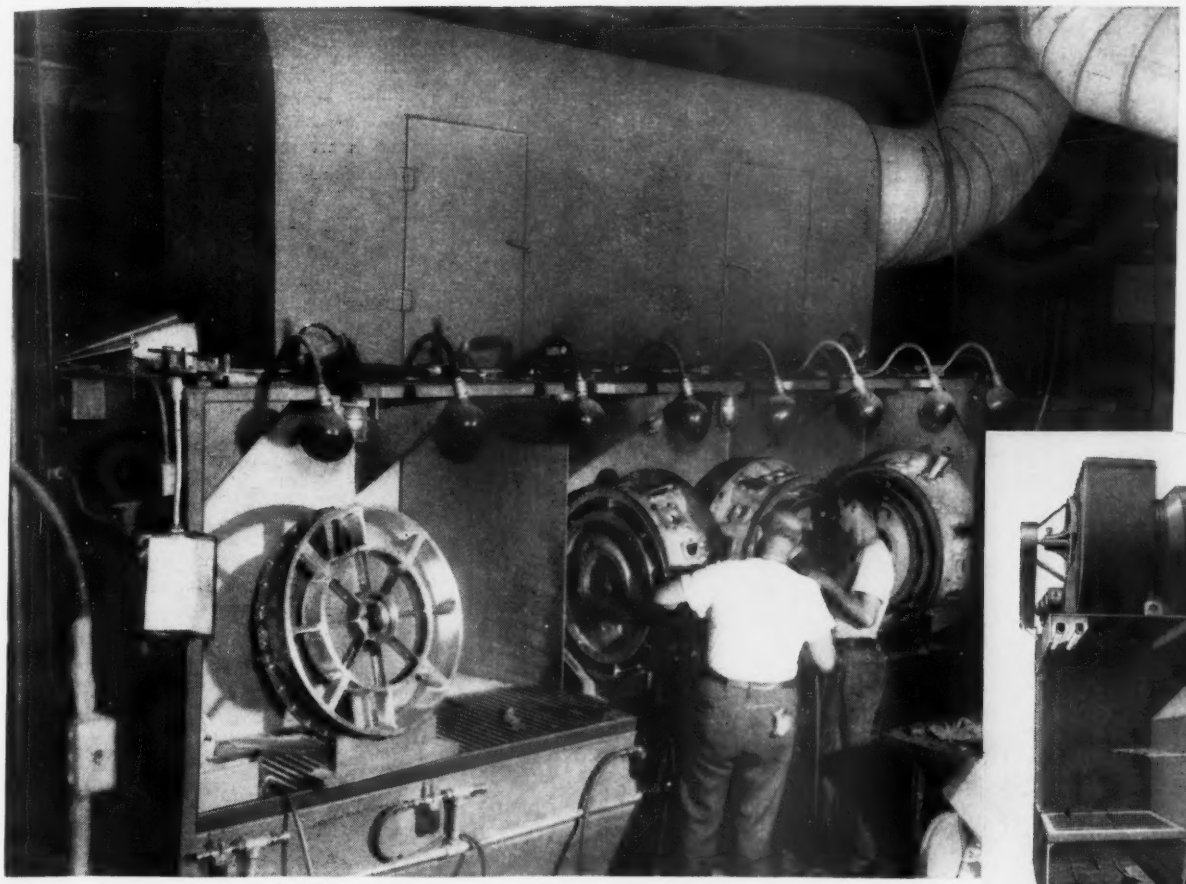
Hard To Retire: We recently had a chatty letter from our old friend James Prendergast, who was connected with the Sullivan Machinery Co., Claremont, N. H., for 36 years, first as foundry superintendent, and then as foundry manager. Jim retired in 1945, but he found it hard to put aside the love of foundry work. In September, 1950, he was made vice president and general manager for the J. B. Ripley Brass Foundry Inc., Windsor, Vt., and casting and foundry consultant for the Cone Automatic Machine Co., Windsor. Last summer the load seemed a bit heavy, so he again retired, with a total of 59 years actually devoted to the foundry business. The letter also recalls some of his interesting experiences at the 1950 AFS convention in Cleveland. Hope to see you in Atlantic City, in May, Jim.

—o—

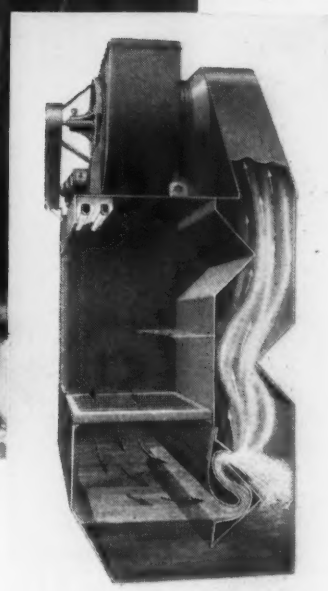
Editors in Washington: Bill Gude, George Pope (business manager turned columnist, see page 288) and the editor attended the January meeting and annual dinner of the Society of Business Magazine Editors at Washington recently, and had an interesting time. Ed C. Kreutzberg, Washington editor of Penton Publications, and a number of other Penton editors also attended the meetings. The annual dinner, with Irwin H. Such, editor of our sister publication, *Steel*, and president of SBME, presiding, featured a political panel, with Senators Owen Brewster of Maine, Paul H. Douglas of Illinois, James H. Duff of Pennsylvania and Brien McMahon of Connecticut providing highly entertaining and informative

(*Concluded on page* 12)

air as clean as you like it!



ROTO-CLONE Type N Bench exhausting light metal burring operation.



ROTO-CLONE Type N Bench cutaway showing single impeller.

CLEAN AIR speeds production for light metal jet parts

AAF ROTO-CLONE Type N Bench Eliminates Dust Nuisance from Finishing Operations.

The aluminum parts shown above soon will be traveling at speeds approaching the sonic barrier. They are the mid and forward frames for jet engines.

Since speed in production is as vitally important as speed in flight, this large manufacturer is equipped with AAF ROTO-CLONE Type N Benches. These eliminate the light metal dust nuisance during burring and buffing operations to make better jet parts . . . faster.

Developed originally by AAF engineers for magnesium finishing, this unit or bench type wet-collector has no moving parts, pumps or nozzles, yet maintains the highest efficiency in collecting extreme fines. The Type N ROTO-CLONE removes dust at the source . . . passes entrained material through a sinuous water curtain under heavy turbulence induced by the flow of air through a stationary impeller. Dust is stored as sludge under water within the base of the self-contained unit. This provides complete safety in the case of magnesum or aluminum dust.

The eleven sizes and three arrangements of the Type N ROTO-CLONE meet requirements for all metal finishing operations such as stand grinding, burring, buffing, sawing, etc. To help speed your metal finishing production call your nearby AAF representative or write for Engineering Bulletin No. 277A.

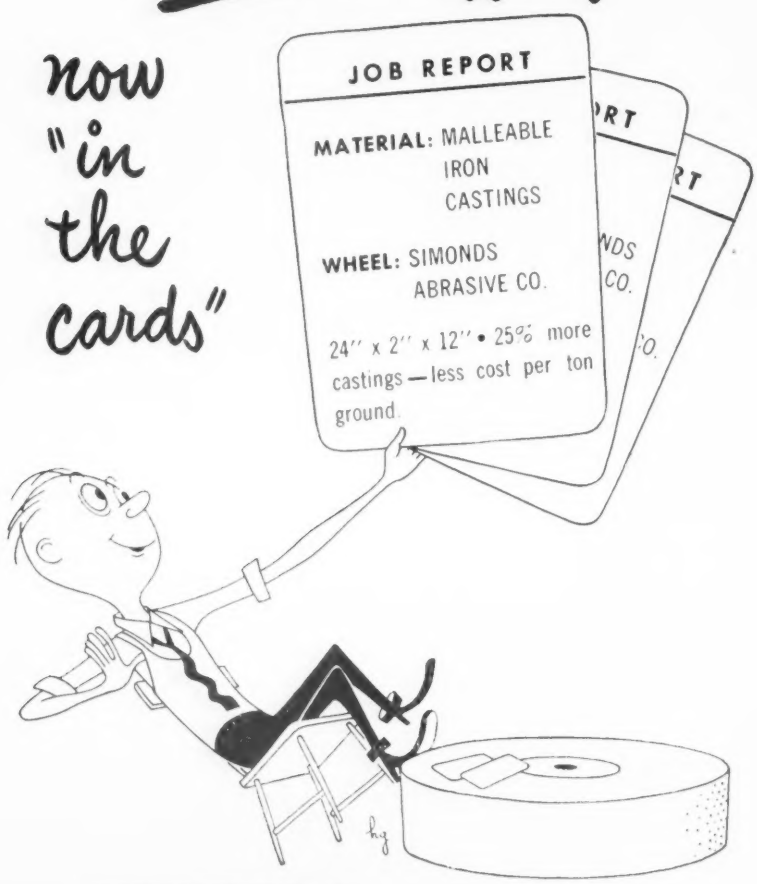
American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Ky.

American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California

®AAF

Better snagging now "in the cards"


JOB REPORT
MATERIAL: MALLEABLE IRON CASTINGS
WHEEL: SIMONDS ABRASIVE CO.
24" x 2" x 12" • 25% more castings—less cost per ton ground.

SIMONDS ABRASIVE CO.

Grinding Wheels

Take the gamble out of grinding wheel selection. Deal yourself in on top grinding performance with Simonds Abrasive Company Grinding Wheels. Complete line includes wheels of every combination of grain, grade and structure . . . wheels of all shapes and sizes . . . mounted wheels and points, segments and abrasive grains . . . industrially proved production tools backed by Simonds Abrasive Company complete quality control, expert engineering service, and 60 years experience as one of the nation's leading manufacturers of grinding wheels. Send now for free data book. Also the name of your Simonds Abrasive Company distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page 10*)

answers to questions propounded by Paul Wooton, executive vice president of the society and master of ceremonies. The next morning the group had breakfast with Roger L. Putnam, the new Director of Economic Stabilization; an hour's visit with Senator Robert A. Taft of Ohio, and a trip to the executive offices of the White House for a business paper press conference with the President. The next day the three FOUNDRY editors were privileged to attend a special luncheon which the working press staged in honor of Prime Minister Winston Churchill. This was an experience never to be forgotten and we came away with the feeling that "The King's First Minister" still is the leading personality in this troubled world of today.

—o—

Studebaker Patterns: In assembling the list of companies supplying equipment for the enlarged Studebaker foundry, presented on page 216 of the November, 1951 issue, an error was made in listing the producer of the patterns. The pattern equipment was built by the City Pattern & Foundry Co., South Bend, Ind.

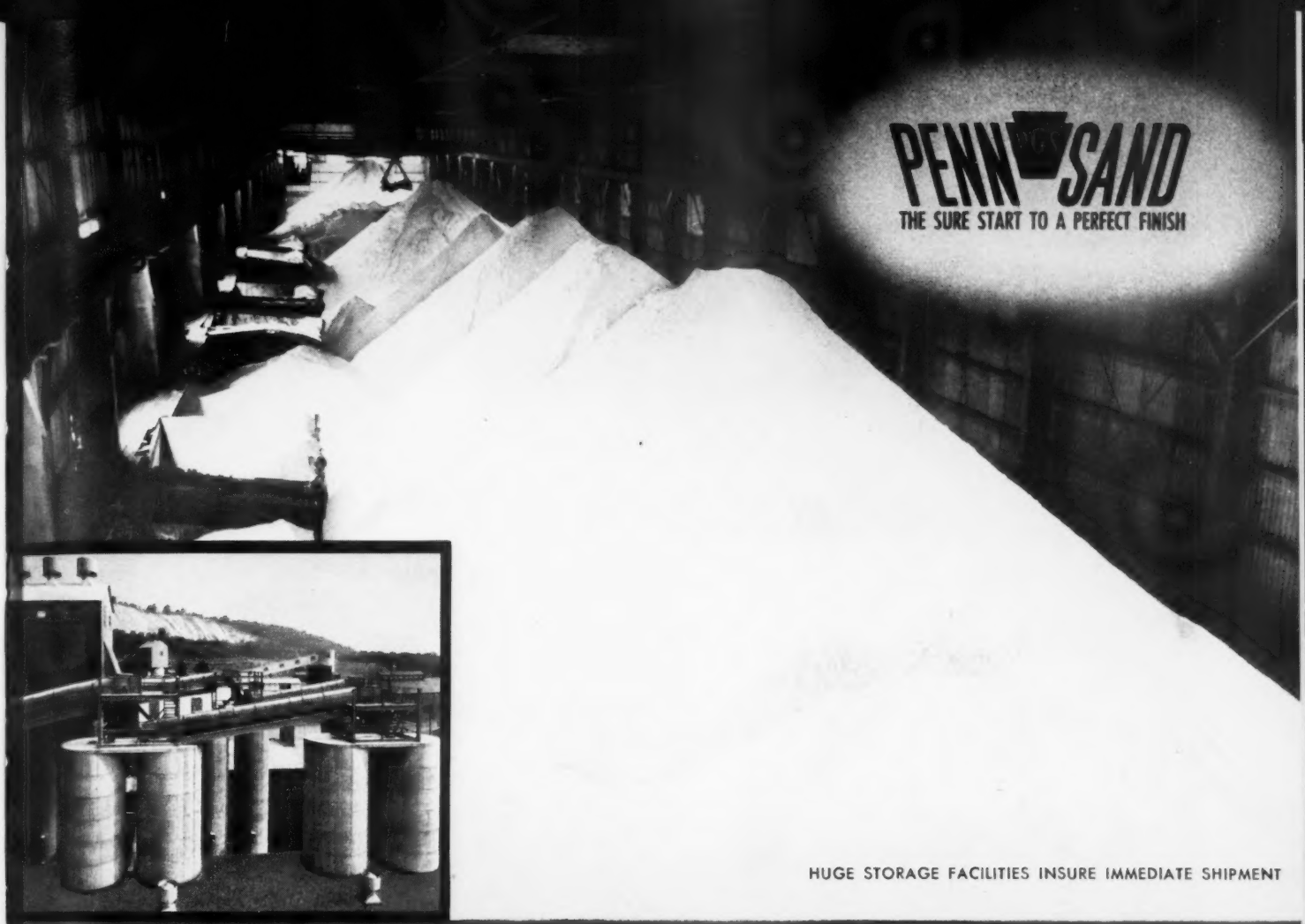
—o—

Back Issues: Dean of Engineering E. B. Norris, Virginia Polytechnic Institute, Blacksburg, Va., is seeking to complete the file of back issues of FOUNDRY. Any person possessing copies of this publication sought by the Institute will confer a favor by writing to the Dean.

The list includes all issues before 1926, Jan. 1, Mar. 1, Oct. 15, 1927, Jan. 1, Mar. 15, Apr. 15, June 15, Sept. 1, Dec. 15 1928, Feb. 1, Mar. 1, June 15, July 1, Aug. 15, Oct. 1, Dec. 15, 1929, Jan. 15, Mar. 15, June 1, July 1-15, Aug. 15, Dec. 15, 1930, Jan. 1, Oct. 1, Nov. 1, Dec. 15, 1931, Jan. 1, Apr. 15, Sept., Dec., 1932, Jan., Sept., Nov., Dec, 1933, Jan. to Dec. inclusive, 1934-1936, Jan., Mar., May, Aug., Oct. Dec., 1937, Feb., July, Sept., Oct., 1938, Jan., Feb., May, June, Aug., Oct., Dec., 1939, Jan., Mar., May, Dec., 1940, All issues for 1941 and 1942, Jan., 1943, Dec., 1944, Apr., June, Dec., 1946, Indexes for Vols. 1 to 70, 1892-1942, and Vol. 74, 1946.

—o—

Acknowledgment: We have had a number of favorable comments about our February issue cover. All of which goes to show that an attractive composition can be made from some of the ordinarily prosaic tools of the metallurgist. But while we toss an orchid to our artists for their handiwork, an assist should be credited to Bill Pellini of the Naval Research Laboratory, Washington. Bill, who, with H. F. Bishop of NRL, coauthored the article, "Solidification of Metals," on which the cover was based, originally suggested the use of solidification curves and a dendrite on the cover to call attention to the article. F.G.S.



HUGE STORAGE FACILITIES INSURE IMMEDIATE SHIPMENT

Make better... smoother castings

without sacrificing permeability

Use PENN SAND — a "natural" for your foundry

You can get better finish and higher permeability with the same sand—PENN SAND. Unique grain structure and distribution give PENN SAND built-in lower density, which in turn results in both lower confined expansion and higher permeability. These inherent advantages save you time and money by reducing rat tails, veining, scabbing, buckles and other defects.

Join the increasing number of foundrymen who are benefiting by the advantages that make PENN SAND a natural for the foundry industry. Washed, dried and screened grades for steel, gray iron, malleable, brass, bronze, aluminum and magnesium castings.

• Write today for further information and free samples

PENNSYLVANIA GLASS SAND CORP.

General Sales Offices: First National Bank Building, Pittsburgh 22, Pennsylvania

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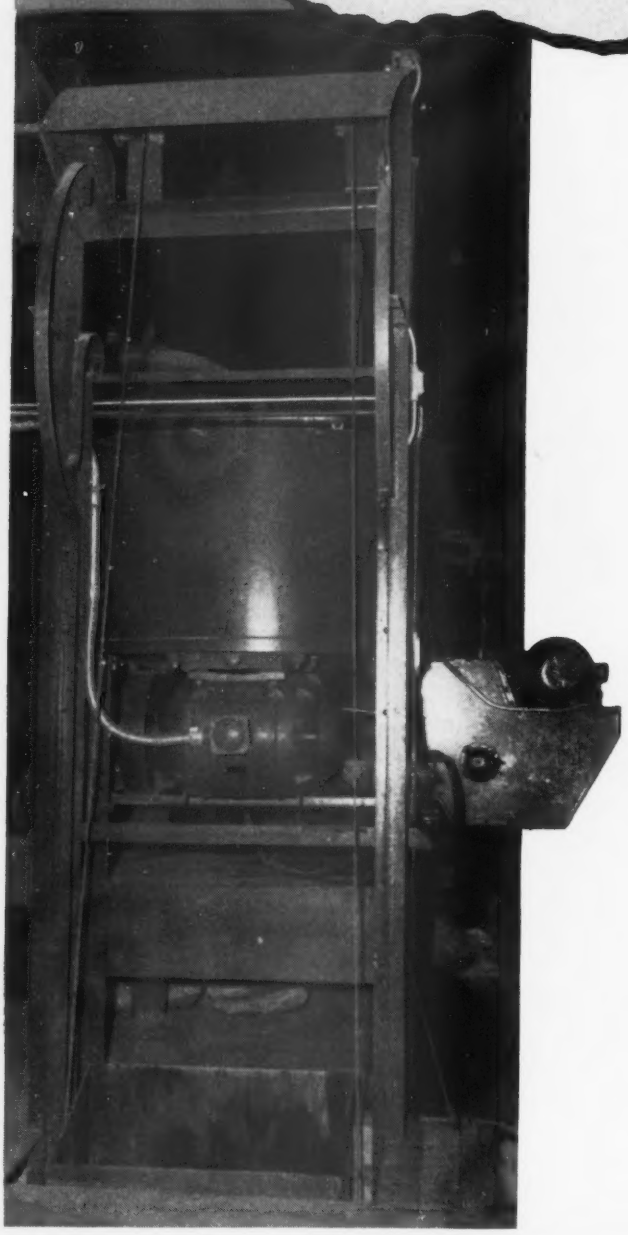
MOLDING SAND · CORE SAND · SHELL-MOLDING SAND · SANDBLAST SAND · SILICA FLOUR

Copyright 1942 Pa. Glass Sand Corp.

"Our new 2F Simpson Intensive Mix-Muller has met increased production demands ... has reduced man hours ... and maintains highest casting quality ..."

says Mr. W. S. THOMAS, Manager
GENERAL MACHINE CO., Foundry Division



FOUR years ago, the General Machine Company, Foundry Division, Emmaus, Pa., switched from natural to synthetic sand for stoker and jobbing castings. This move necessitated new sand preparation equipment—equipment that combined controlled accuracy with high speed production.

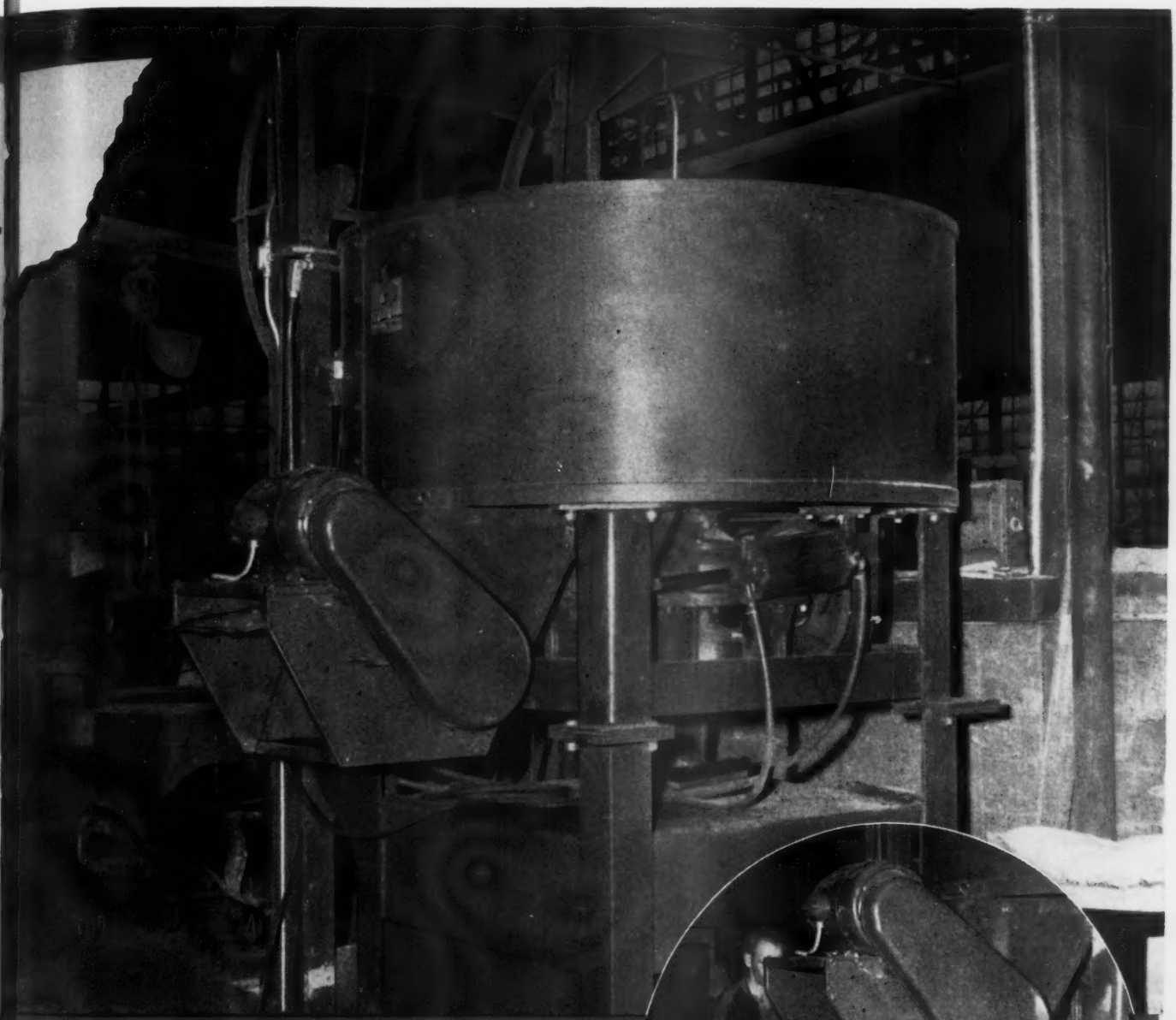
First, a Model 1-H SIMPSON Intensive Mix-Muller was purchased and then later supplemented with a SIMPSON Porto-Muller. Together these two units met all existing sand requirements even when the increased demand for castings required them to be operated for 12 to 16 hours a day. "Despite these unusual circumstances," says Mr. Thomas, "the quality of my sand was never reduced, although both mixers were often overloaded and operated constantly."

It was this demonstration of superior performance under adverse conditions that prompted the purchase of a new high capacity 2F SIMPSON Mix-Muller. This modern machine doubles the previous sand output . . . eliminates about 20 man hours of work a day . . . and easily maintains the necessary high casting quality. Scrap consistently runs as low as 4% per month on 250 to 350 tons of finished castings . . . and that includes machine shop scrap.

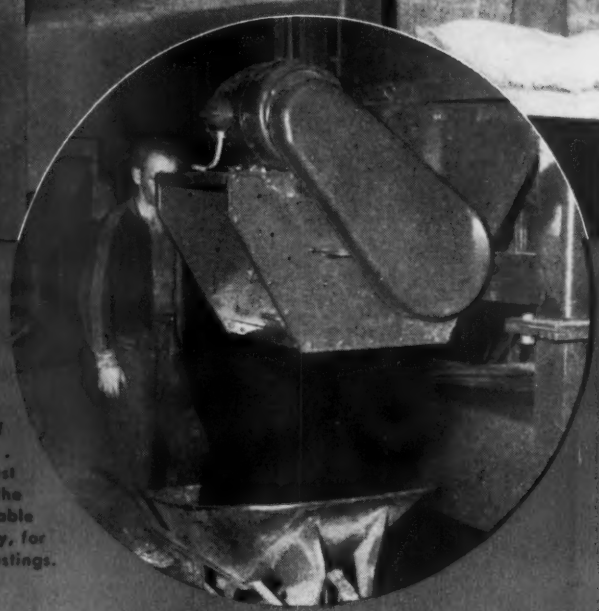
So today, more than ever, "castings by General Machine" are in great demand—thanks to efficient foundry operation and the ability of SIMPSON Mix-Mullers to turn out sand in greater *quantity* and *quality*.

Remember, whatever you're casting—the speed—the quality of your finished product—the efficiency of your operation—is *all* greatly dependent upon your method of sand preparation. That's why foundries throughout the country depend on SIMPSON Intensive Mix-Mullers.

For further details on the new 2F and 3F Mix-Mullers, send for Bulletin 511.



● Shown above and at left, on opposite page, are two views of the new 2F SIMPSON Intensive Mix-Muller recently installed in the gray iron foundry of General Machine Company, Emmaus, Pa. National Aerator and Bucket Loader provide more speed, accuracy, and better sand.



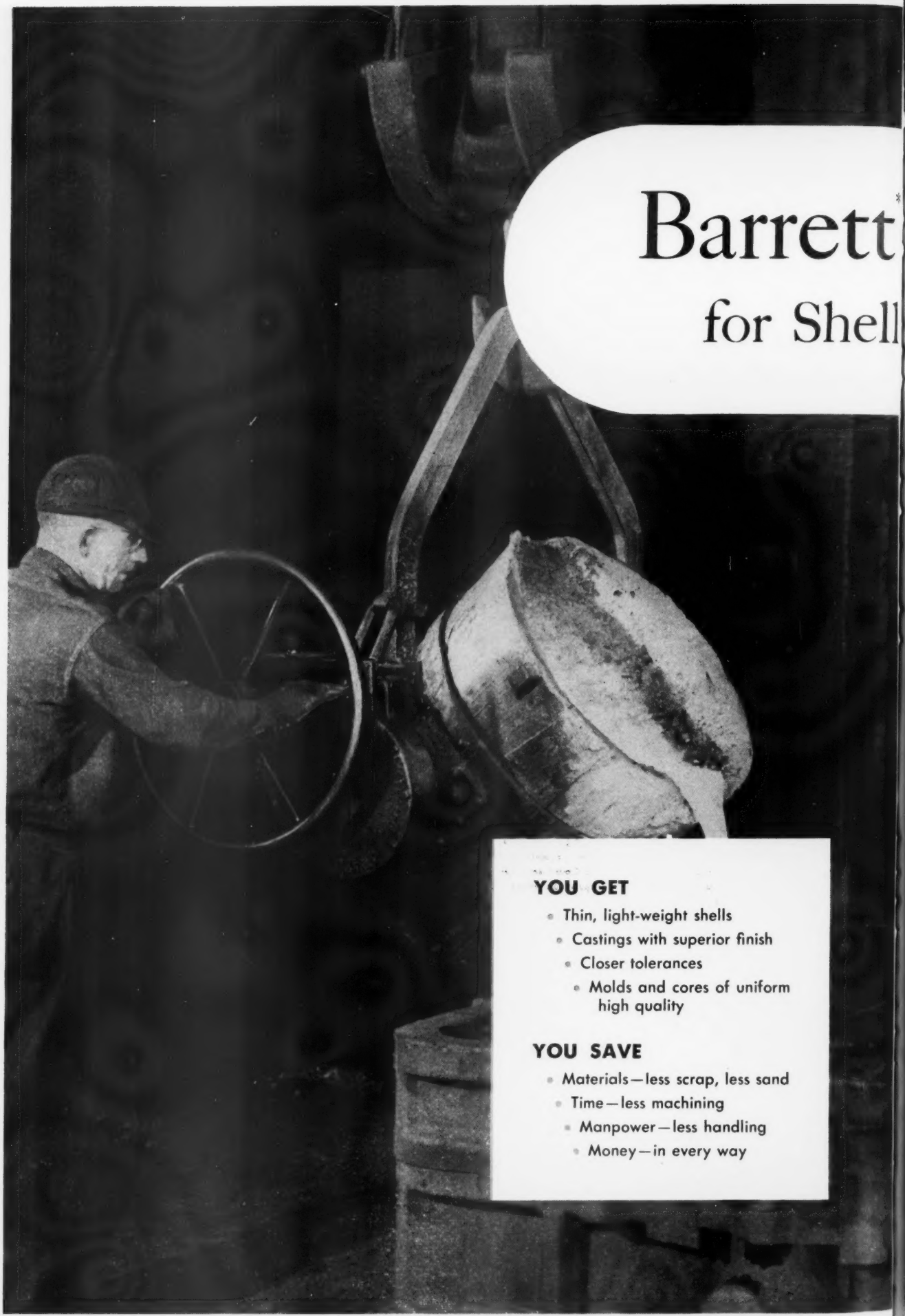
● At the right is a close-up view of the improved National Aerator . . . which fully aerates and discharges just as fast as sand is received from the mixer. With this compact, dependable unit, users obtain increased flowability, for producing smoother surfaced clean castings.

SIMPSON
Intensive
MIX-MULLERS

National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents: For Continental European Countries — George Fischer, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney. for Argentina, Brazil and Uruguay — Equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — CASCO ,S. De R.L., Mexico, D.F.


Barrett
for Shell
YOU GET
Thin, light-weight shells
Castings with superior finish
Closer tolerances
Molds and cores of uniform high quality
YOU SAVE
Materials—less scrap, less sand
Time—less machining
Manpower—less handling
Money—in every way

Phenolic Resins

Molding and Core Binders

BARRETT has the basic raw materials

Barrett, producer of the required basic raw materials, now offers you phenolic resins for producing better castings at lower costs—your assurance of UNIFORM QUALITY, DEPENDABLE SUPPLY, STABLE PRICE.

Barrett is Basic

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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*Reg. U. S. Pat. Off.

CLOSE-TOLERANCE CASTINGS—HIGH-YIELD PRODUCTION

Using thin-shell molds and cores of fine grained sands bonded by BAKELITE Phenolic Resins results in castings that need only a minimum of finishing. Surfaces are almost pattern-smooth, and tolerances are as close as .002 to .005 of an inch per inch. The high yield of good castings, ferrous or non-ferrous, means a greater number of castings per ton of metal poured.

The shell-molding process forms highly porous molds that permit the free escape of gases. There is no burnt-on or burnt-in sand on metal. Built-in guide pins and holes assure accurate registration of mold parts so that allowance for mold shift is unnecessary.

Molds and cores are strong, moisture-resistant, and stable, with long storage life. Far lighter than those made with ordinary materials, they spell notable savings in handling effort and space.

Yielding smoother, better castings, using less sand, meeting heavy production schedules, this process means new economy for foundry operations.

For information about the BAKELITE Phenolic Resins developed for the shell-molding process, fill out and mail the attached coupon.

Dept. DO-29, BAKELITE COMPANY,
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please mail my free copy of Booklet K-8, "BAKELITE Phenolic Resins for Foundry Molds and Cores."

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*Company*_____

*Street*_____

*City*_____ *State*_____

BAKELITE
TRADE-MARK
PHENOLIC
BONDING RESINS

TRADE MARK

BAKELITE COMPANY
A Division of
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In Canada:
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more production...less waste!

COLEMAN OVENS

Coleman Tower Oven at Forest City Foundries Co.

● **COLEMAN TOWER OVENS** produce perfectly baked cores, need less manpower, result in increased tonnages of better quality castings.

Patented open center, by increasing oven loading accessibility, improves productivity of the coremakers. Coleman Tower Ovens, using only 25% of the floor space required by batch-type ovens provide labor savings up to 75% by eliminating racks, trucks and other time-wasting handling methods.

Coleman Tower Ovens help you overcome acute labor shortages and scarcity of materials. They are vital in meeting the demand for increased casting production.

Only COLEMAN OVENS *offer all these advantages:*

- PERFECT DRYING AND BAKING eliminate manpower and casting losses due to make-overs and rejects.
- INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.
- HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.
- GREATEST SAVINGS IN FUEL by using the most economical fuel available.
- MOST ECONOMICAL CORE BINDERS, oil or resin, for your particular casting requirements, can be used.

A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

MEMBER FEMA

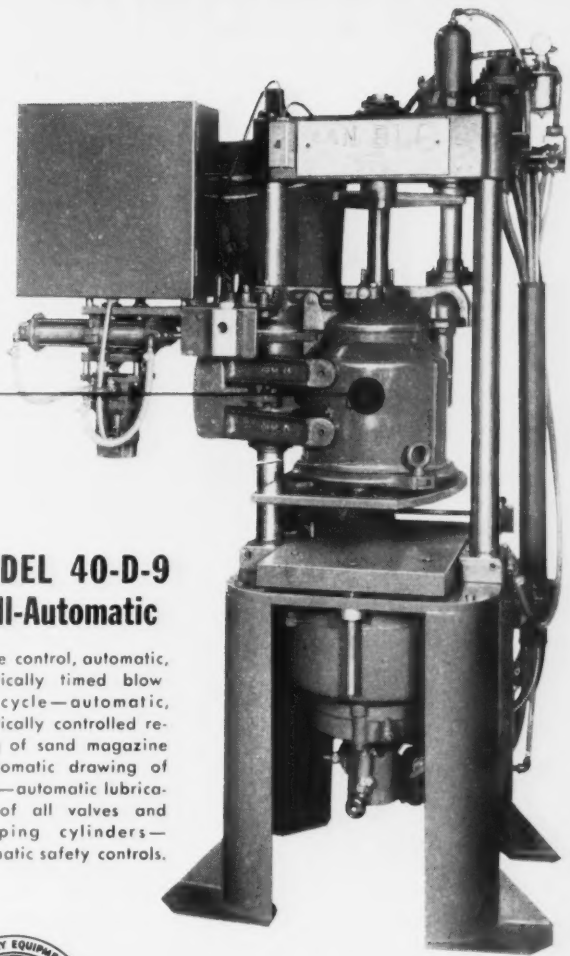
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Motor-driven plows
"Aerating" air circuit

THE ONLY CORE BLOWER WITH A *Mechanized* SAND MAGAZINE

Motor-driven plows and "aerating" air circuit make it possible for the

SAN-BLO



MODEL 40-D-9
Full-Automatic

Single control, automatic, electrically timed blowing cycle—automatic, electrically controlled refilling of sand magazine—automatic drawing of cores—automatic lubrication of all valves and clamping cylinders—automatic safety controls.

- To blow *any* core sand mixture that can be hand-rammed, including resin-bonded sands!
- To blow or green-top cores with *regular facing sand*—without additional hand-ramming!
- To blow sand mixtures with moisture content up to 8%—green bond strength up to *8 lbs.!*
- To blow all cores weighing up to 40 lbs. each, *without* changing sand magazine!
- To *blow* sand—not push it! No "piping" or "bridging" in SAN-BLO's sand magazine!
- To blow a *range* of core sizes otherwise requiring 3 or 4 different size core blowers!
- To blow FAST! Small or large cores are blown—ready for removal, in but a *very few seconds!*

Write for new
CATALOG CB-3

FREE . . . illustrated catalog with complete description of the new SAN-BLO core blower . . . specifications on all 30 models . . . advantages for every type of foundry . . . core room cost savings . . . typical installations . . . list of users . . . WRITE TODAY, using company letterhead.

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THE FEDERAL FOUNDRY SUPPLY COMPANY
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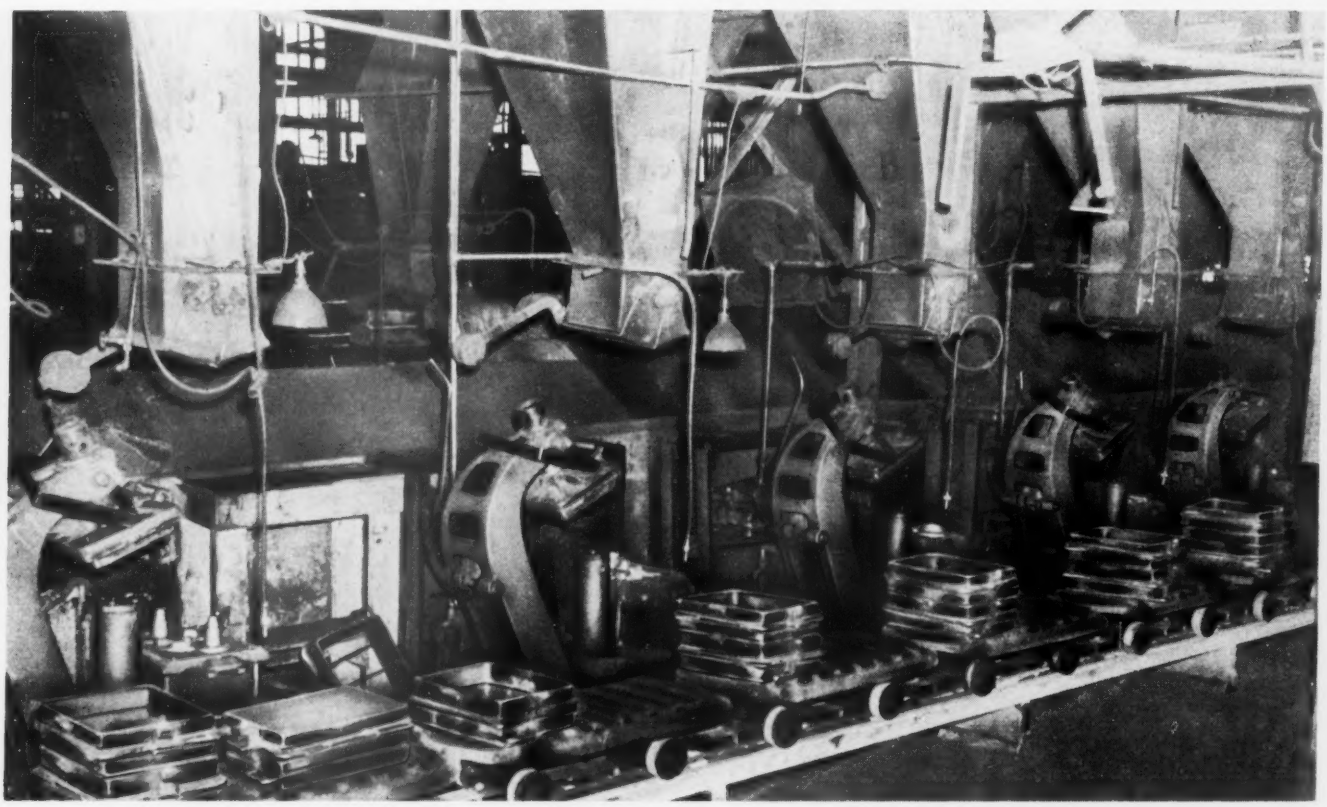
BUILT FOR FAST ACCURATE STRENUOUS SERVICE

Improved Heavy Duty Molding Machines.
Jolt Squeeze and Strip with Adjustable Pin-Lift.



A BATTERY OF NICHOLLS 14 PL MACHINES

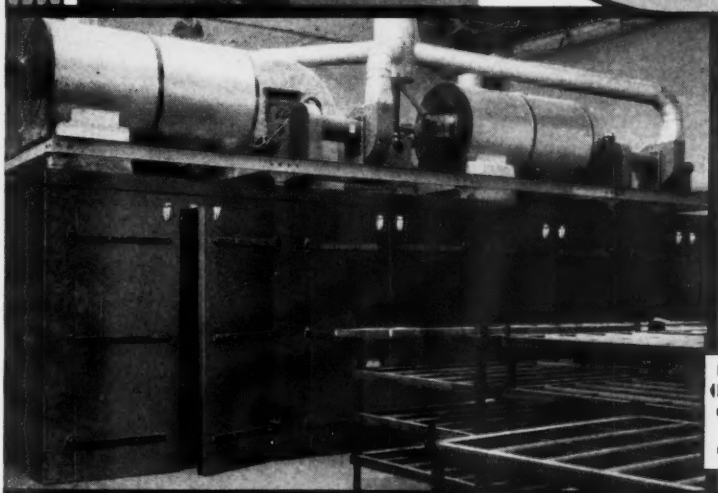
The 14 PL is a heavy duty, jolt squeeze molding machine with a fast, accurate draw. It is simple to operate and will produce sharp, clean fast molds. Also equipped with protection feature that assures the head will be in squeezing position before the control valve is operated.

Nicholls builds a complete line of Molding Machines comprising stationary and portable types for the production of light, medium and heavy castings. Descriptive literature available for each type.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, N. Y.
Established 1910

NICHOLLS

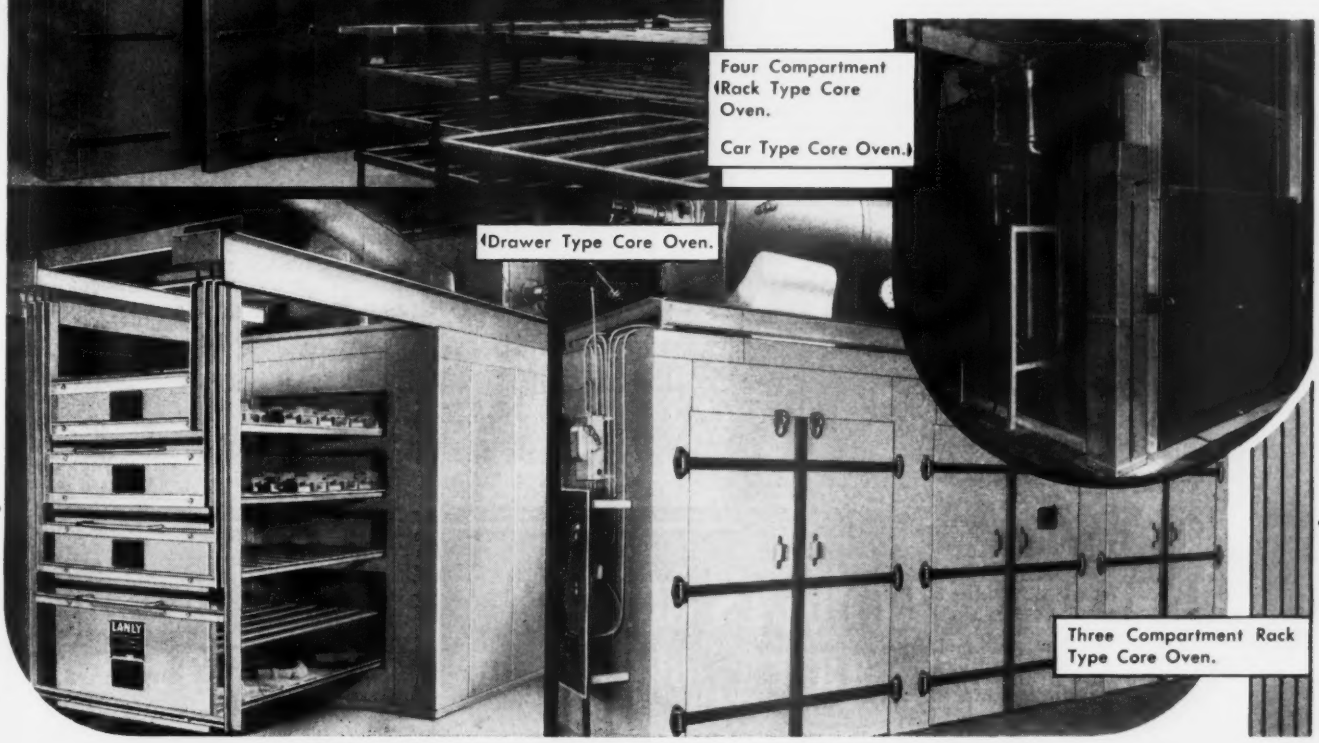
Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

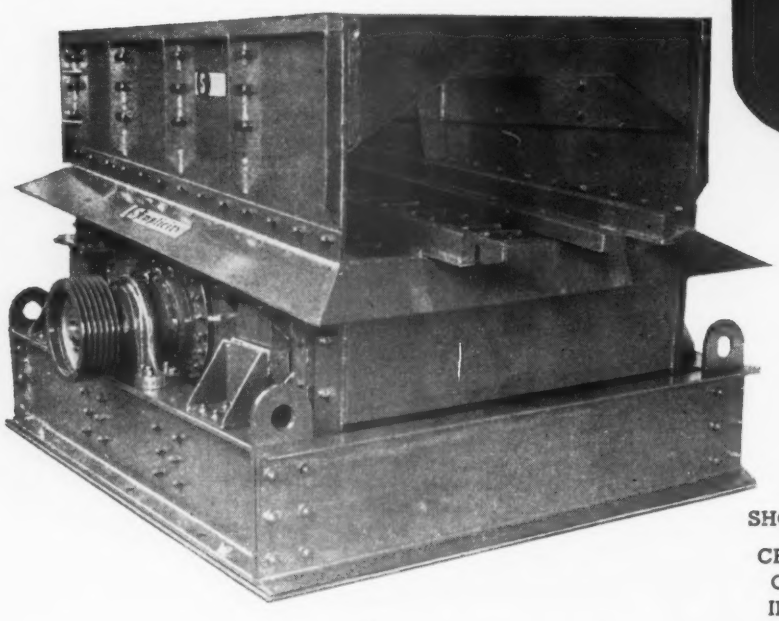
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

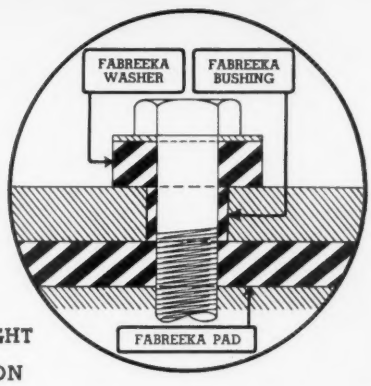
Write for Literature and Complete Information.


Four Compartment Rack Type Core Oven.
Car Type Core Oven.
Drawer Type Core Oven.
LANLY
Three Compartment Rack Type Core Oven.

for IMPACT SHOCK and VIBRATION

Under Shakeout Machines





SHOWN AT RIGHT
CROSS SECTION OF FABREEKA INSTALLATION

FABREEKA

Reduces Maintenance and Increases Production

FABREEKA Pads, bushings, and washers are installed under Jolt Moulders, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production.

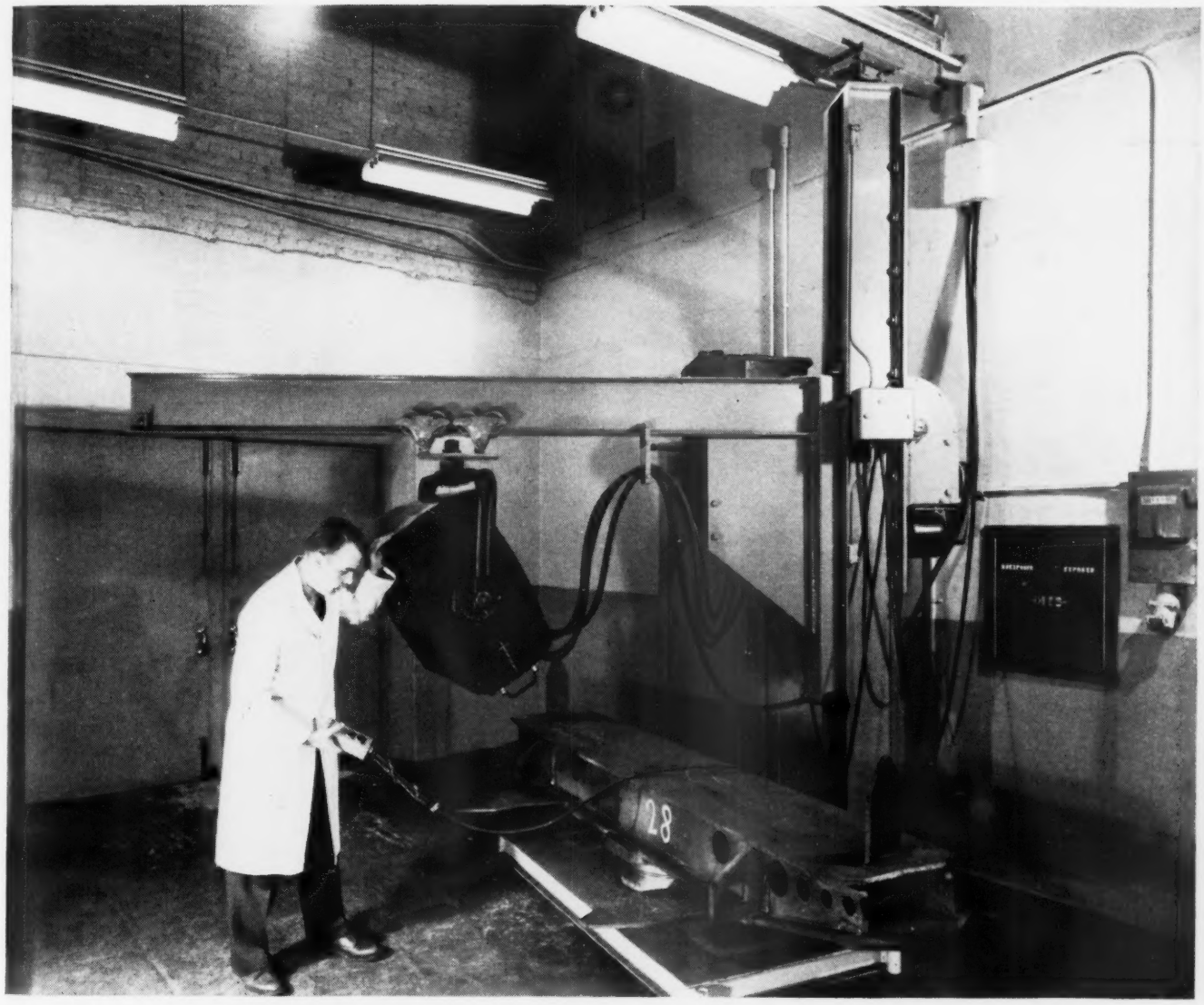
It Pays to Specify Fabreeka

In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.

Write for latest literature

FABREEKA PRODUCTS COMPANY INCORPORATED
222B SUMMER STREET BOSTON 10, MASSACHUSETTS

Here's PROOF that X-Ray cuts costs, speeds production

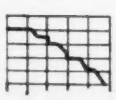


Scores of industries use non-destructive x-ray inspection to lower costs, speed production, improve products. Here are just a few typical* reports:

"Examination of one type of crankshaft showed lack of fusion at the chill . . . pointed the way to saving $250,000 on a year's production."

"It is estimated that on two jobs alone the foundry saved over $13,000 and added to its prestige by delivering castings in which the customers could have utmost confidence."

"Through the use of x-ray, risers have been added, relocated, reduced and even eliminated on many patterns, which in turn has made it possible to produce better castings at lower cost."



"Radiography accounted for the salvaging monthly of $35,000 worth of parts, enabling the foundry to increase its yield and pass on a 20% saving."

"The only reliable way of detecting internal tears is by radiography. On a radiograph the internal hot tear will show branches emanating from the main crack."

The GE model OX-250 is by far the world's most popular industrial radiographic unit. With an operating range from 60 to 250 kvp, 2 to 10 ma, this versatile unit is available in seven different mountings to meet varied industrial needs.

Let one of General Electric's highly trained application specialists appraise your inspection needs. Ask for the new 28-page information book, Pub. 7A-3292, from X-Ray Department, General Electric Company, Milwaukee 14, Wisconsin, Rm. YY3.

*Names supplied on request.

GENERAL ELECTRIC

STERLING'S "FOUR POINT

HELPS PRODUCE BETTER, F

THE STERLING GRINDING W

PRODUCTION CONTROL"

FASTER FOUNDRY GRINDING

Test these superior "Wheels of Industry" on your own machines . . . prove to your satisfaction the faster production you can steadily maintain with them.

STERLING'S "Four-Point Production Control"—through ENGINEERING, COMMITTEE, LABORATORY, and MANUFACTURING—means better grinding wheels for all types of foundry jobs.

Sterling's ENGINEERING determines, right on the job, what is the correct abrasive unit to solve your particular problem. COMMITTEE control gathers together Sterling grinding experts for careful checkup of your needs before recommendations are made. LABORATORY control takes these recommendations and builds them into the correct wheel formula. Then and only then, does MANUFACTURING, carefully controlled, take over to produce what has been given a triple checkup. No wonder Sterling Grinding Wheels do such efficient jobs of swing frame, stand and portable work! They are tailor-made for every assignment!

Foundrymen have learned through experience to specify Sterling Grinding Wheels because our specification-duplication means identical, better results wherever these abrasive units are used.

In your grinding departments, Sterling's "Wheels of Industry" can produce startling results. Our engineers are ready to explain how easily it can be accomplished.

BEST IN THE TEST—THAT'S STERLING!

● During a recent test of Sterling High Speed Snagging Wheels, size 24 x 3 x 12, the department foreman reported them the best grinding wheels they had ever used on miscellaneous alloy steel castings. Comparison proved the Sterling Wheels were freer cutting and provided 12% more life than other brands tested! Think of it — six hours of extra efficiency from the Sterling "Wheels of Industry" at no extra cost!

These results are typical and indicate the ease with which you can solve your problems with Sterling Grinding Wheels.

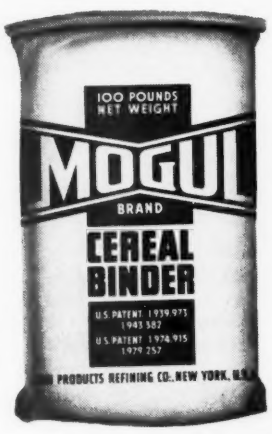
Ask for These STERLING Research and Development Folders - - -

● When sudden decisions must be made regarding proper grinding wheels to use, you will find these folders handy to have in a nearby file. You will appreciate having the interesting data to study while waiting for the Sterling engineer's call. Especially important is the popular book, "The Art and Science of Grinding," now in its fifth edition. There is no obligation . . . just send us your name and address and your folders will be mailed at once.

WHEEL DIVISION TIFFIN OHIO

GRINDING WHEEL INSTITUTE MEMBER

Bill— you can cut drying time with Mogul!



LARGEST SELLER IN THE FIELD!

- **MAKES SMOOTHER CORES • CUTS DOWN DISCARDS**

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

Kordek, the preferred dry bond for cores . . .

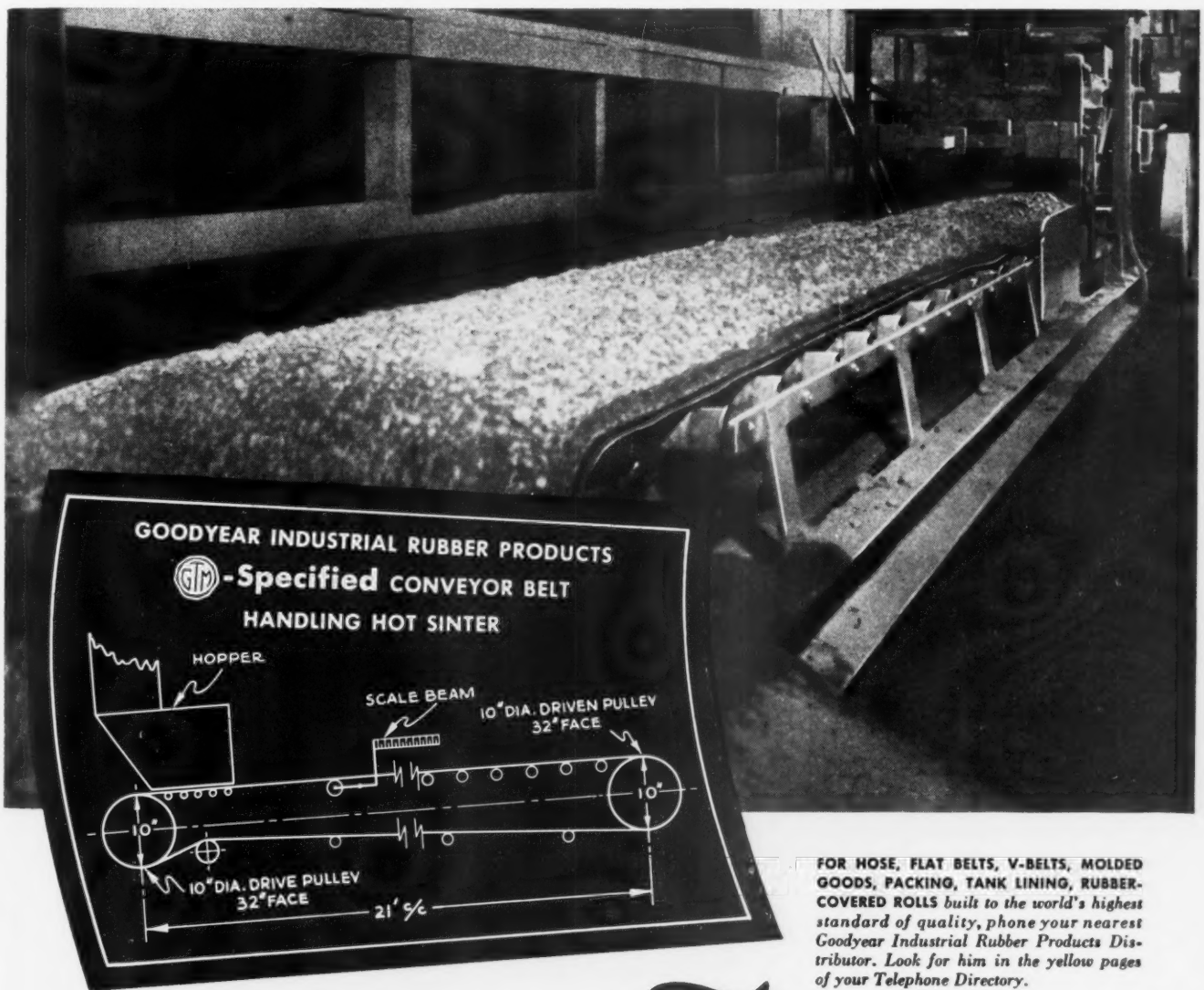
CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

Triple Service

Goodyear Conveyor Cuts Belt Cost $413—while handling almost three times the tonnage of the previous belt

Ordinary 5-ply conveyors handling hot sinter at 200°-300° F. failed in three months or less because of heat, caustic attack on the belt and small drive pulleys. The best record was 23,545 tons before failure on the top cover.

Then the G.T.M.—Goodyear Technical Man—recommended a 3-ply Goodyear Style 6740 "Hot" Belt. It outlasted any other belt ever tried—served almost 9 months—handled 68,750 tons of material. This thinner belt gave closer control on the weighing device measuring out sinter as well—saved an estimated $413.44 ($6.08 per M tons) on belt costs alone!

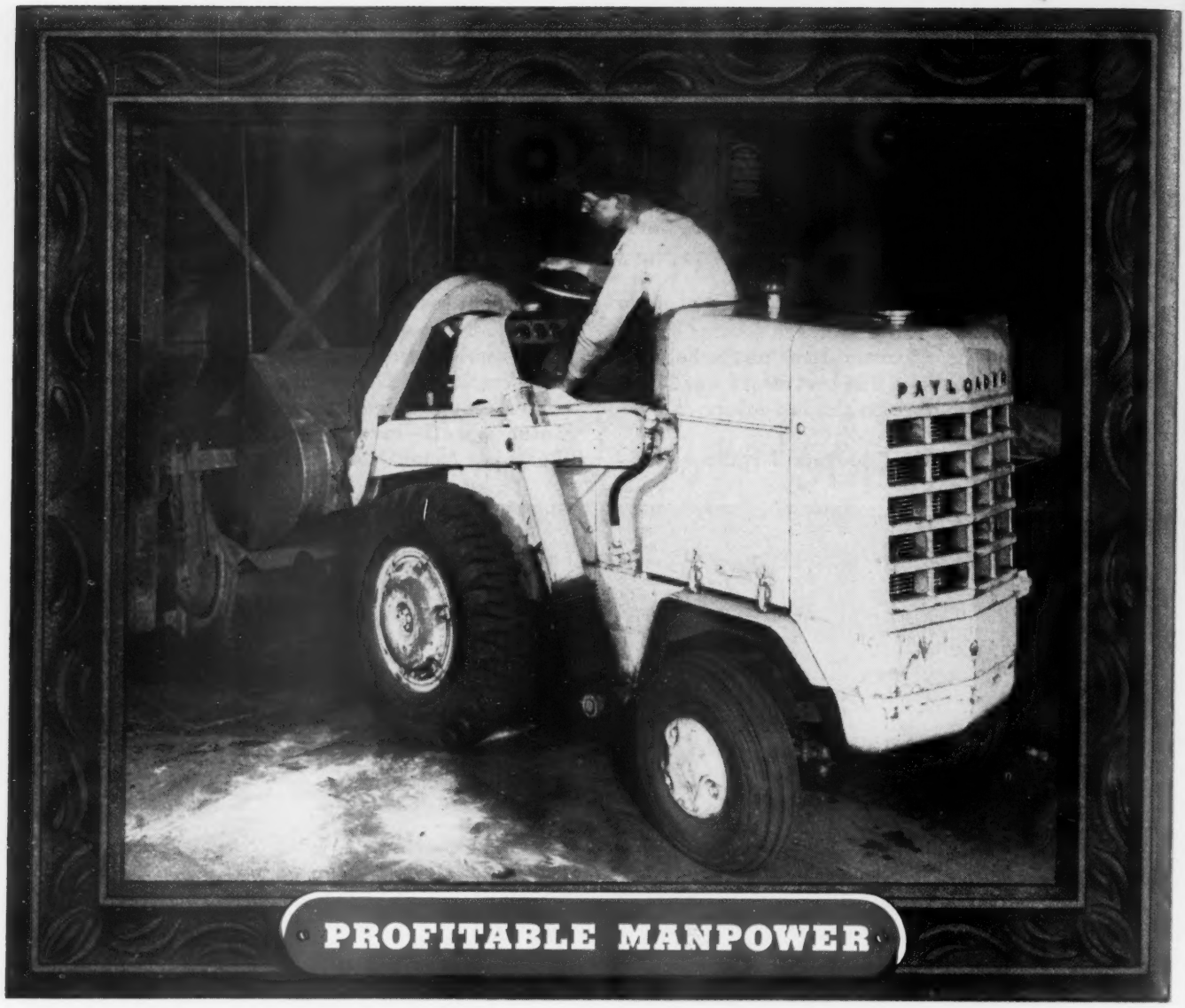


FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"— Every Sunday — ABC Network



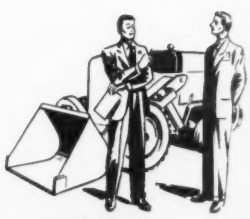
PROFITABLE MANPOWER

This man may have been good with a wheelbarrow and hand shovel, but his production is several times greater as a "PAYLOADER" pilot. He's happier and so is his boss because they both make more money.

When it's a matter of handling bulk materials — sand, scrap, coke, chips, limestone or *any* bulk material — chances are you can move it faster, cheaper and better with a "PAYLOADER" because these special tractor-shovels are proven cost-cutters in hundreds of foundries.

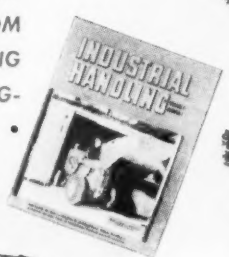
"PAYLOADERS" are available in seven sizes, from 12 cu. ft. to 1½ cu. yd., to master your jobs both indoors and outdoors. Get full facts *now* on cost-cutting, time-saving, production-boosting "PAYLOADER." The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

UNLOAD BOX CARS • CARRY SAND, COKE, SCRAP, LIMESTONE, ETC. • TRANSPORT AND DISTRIBUTE SAND TO MOLDING STATIONS • REMOVE USED SAND FROM FLOORS • WINDROW SAND FOR THE CUTTER • CHARGE MULLERS, TUMBLING BARRELS • FEED CONVEYORS, ELEVATORS, HOPPERS, MIXERS • CLEAN UP GANGWAYS, AISLES AND OTHER AREAS • HANDLE SCRAP, SMALL CASTINGS, SLAG • LIFT-HAUL-PUSH-PULL • REMOVE SNOW.



VISIT

the "PAYLOADER" booths, No's. 1730 & 1829, at the Foundry Show, Atlantic City.



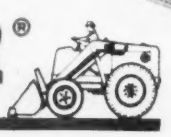
IDEAS PAY

and "Industrial Handling" is full of profitable ideas developed by "PAYLOADER" users. A request on your letterhead gets you on the regular mailing list without cost.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • *Since 1920*



CARL-MAYER

CORE AND MOLD OVEN *Customers from Coast to Coast will tell you -*

Experience and Achievements are Your Gain

VERTICAL CORE OVEN
at A. C. Williams Co.

CARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

Aluminum Co. of America
American Brake Shoe Co.
American Radiator Co.
Blaw-Knox Co.
Brown Industries
Buick Motor Div. of General Motors Corp.
Bucyrus-Erie Co.
Cadillac Motor Div. of General Motors Corp.
Columbia Steel Corp. (U. S. Steel Corp.)
Crucible Steel Castings Co.
Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Electric Co.
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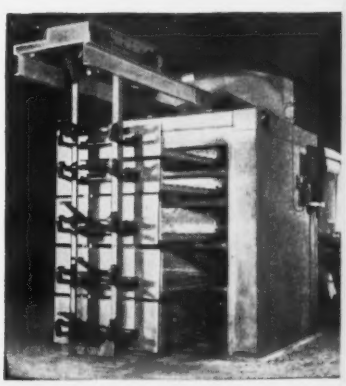
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

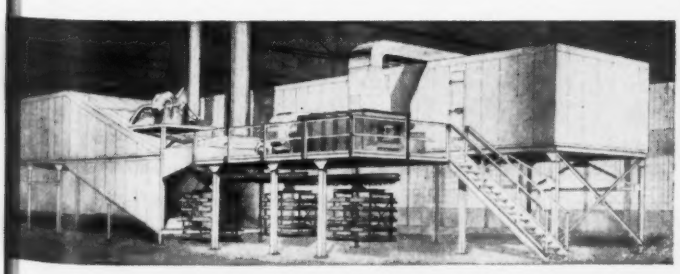
The outstanding high calibre of Carl-Mayer engineering and construction is verified by the importance of foundries we are serving repeatedly.

It will pay you to contact Carl-Mayer before placing your next order for any type and size of core and mold oven, or other types of industrial furnaces and ovens.

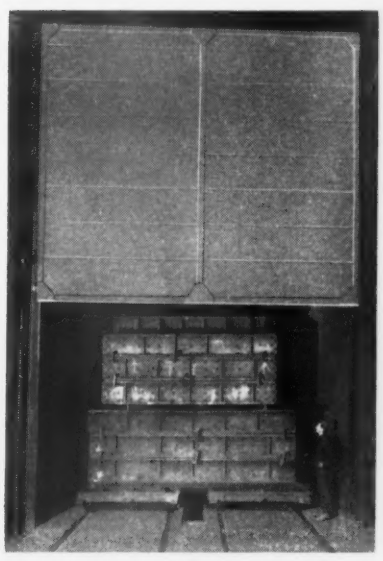
WRITE FOR BULLETIN NO. 141 and 350



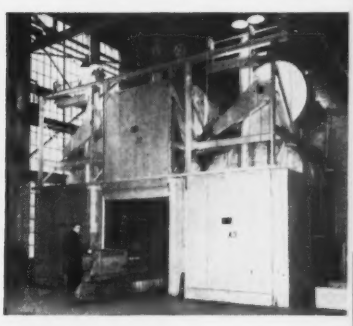
ROLLING DRAWER CORE OVEN
at Aluminum Co. of America



HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.



MOLD OVEN at Blaw-Knox Div.
of Union Steel Castings Co.



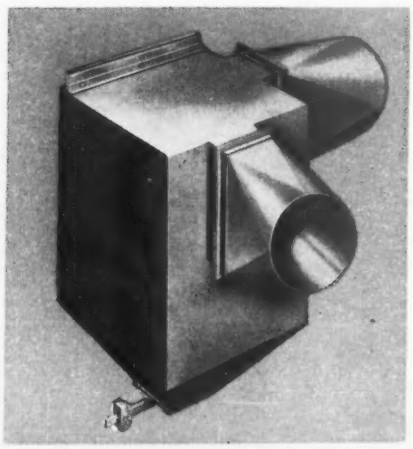
RACK TYPE CORE OVENS
at Aluminum Co. of America

THE CARL-MAYER CORPORATION

3030 Euclid Avenue * Cleveland, Ohio

BACKED BY REPUTATION AND OVER 30 YEARS' EXPERIENCE

the VELOCITRAP



THE Schneible Velocitrap performs an important function on any dust collecting system, by removing heavy or abrasive solids, or materials of salvage value from the system.

Solid particles are expelled by centrifugal force from the air stream. Through ports in the casing of the unit these particles are deposited in a hopper. Only the minimum size particles reach the dust collector. This saves dust collector capacity and reduces wear on the duct system.

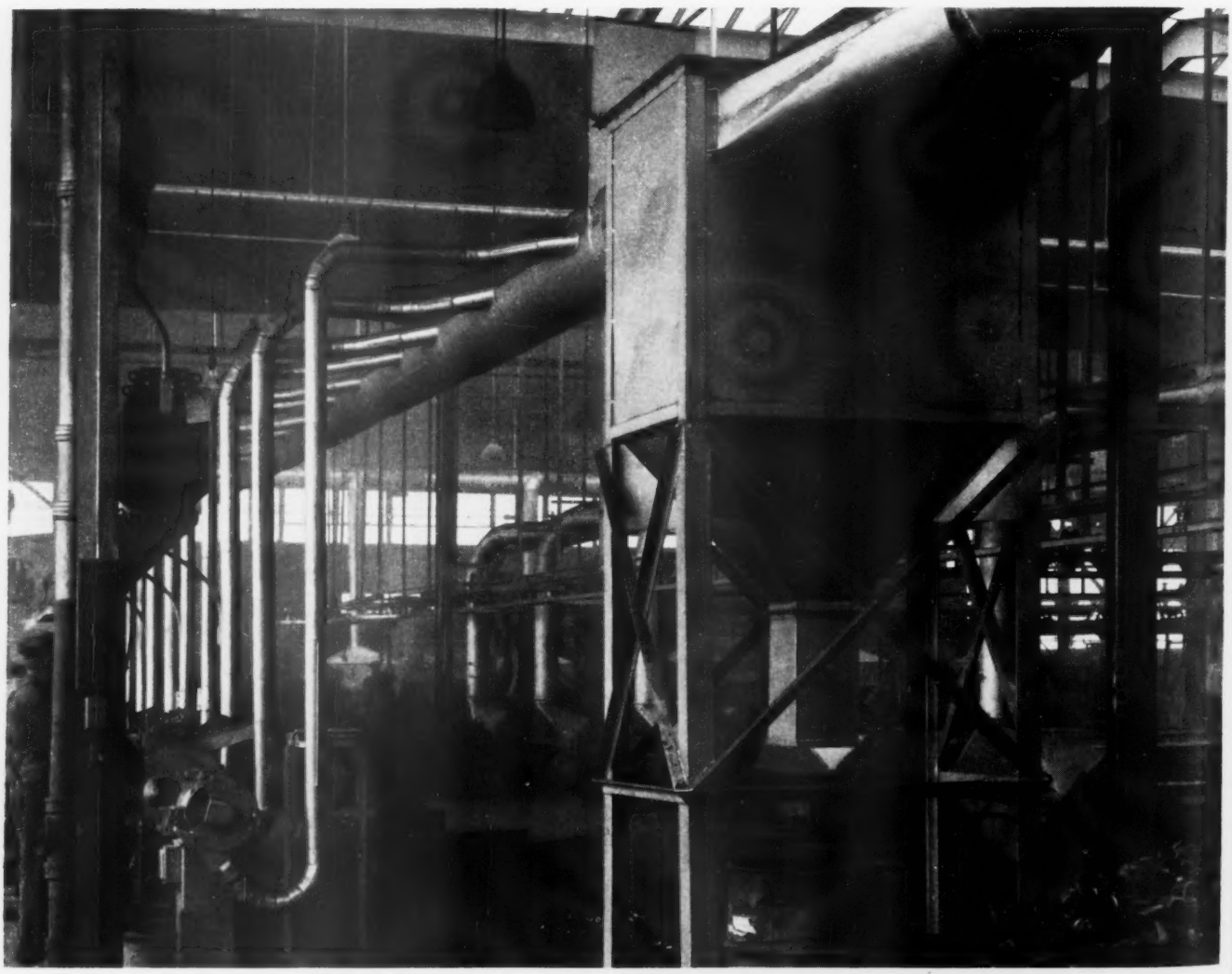
In foundries, the Velocitrap recovers abrasives from cleaning operations, sand from downdraft shake-outs, screens, mullers and sand systems. It eliminates drop-out boxes at grinders and tumbling mills.

The Velocitrap is engineered and constructed for long service and is adaptable to either wet or dry-method dust collecting systems.

Write for details in Bulletin No. 246

CLAUDE B. SCHNEIBLE COMPANY

P. O. Box 502, Roosevelt Annex • Detroit 32, Michigan



PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

MANUFACTURERS • ENGINEERS • CONTRACTORS

Late Foundry News

FEBRUARY 26, 1952

DECONTROL: OPS officials are reported to be giving some consideration to decontrol of casting prices. This step is favored by most foundrymen. With a slowing in demand for most types of light castings, and the consequent scramble for business, a floor on prices would appear more practical than a ceiling. Castings in heavy demand are chiefly for defense and therefore subject to renegotiation. Meanwhile, OPS has amended the casting price regulation CPR-60 to increase ceiling levels on zinc-base die castings to reflect an increase in the cost of zinc and zinc-base alloy ingots. The amendment became effective Feb. 19.

ACQUIRES FOUNDRIES: National Malleable & Steel Castings Co., Cleveland, is purchasing the Capitol Foundry Co., Phoenix, Ariz., and its subsidiary, Arizona Iron Works. Capitol specializes in producing white iron grinding balls used in ball mills at copper concentrating plants, but National plans increased production of miscellaneous iron and steel castings there through a $1,500,000 plant expansion program.

RECORD SHIPMENTS: Release by the Bureau of the Census of data for December shipments of ferrous castings shows new high records for gray iron and malleable in 1951. Last year's total for gray iron was 14,987,696 tons. Malleable iron shipments topped a million tons for the first time at 1,083,545. Steel casting shipments of 2,100,970 tons brought the total for ferrous castings to 18,172,211 tons, nearly 20 per cent ahead of 1950 and highest in history.

BRASS-BRONZE INGOTS: Makers of brass and bronze ingots recently were told by NPA that amount of copper scrap allocated to the industry has increased consistently since last fall, and allocations and receipts are expected to be balanced shortly. However, some maldistribution still exists in supplies, and the movement to divert dealers' excess scrap inventories into normal trade channels is being pushed. No increase in domestic copper production is expected before early 1953. Shipments of ingots improved sharply in January to 28,315 tons, highest in six months and 35 per cent ahead of December deliveries, according to the Defense Council of the Ingot Brass and Bronze Industry. Prices of brass and bronze ingots having a high tin content have been increased as a result of the rise in tin.

PERSONALS: American Manganese Steel Division, American Brake Shoe Co., has appointed W. Frank Kelly assistant vice president, and John E. Holtman general superintendent of foundries . . . Leonard T. Sylvester, president, Mathews Conveyer Co. Ltd., Port Hope, Ont., succeeds the late William L. Dean as president of Mathews Conveyor Co., Ellwood City, Pa. Odd H. McCleary will be vice president, general manager . . . W. A. Fitzgerald has been named assistant sales manager of the Ajax Metal Division, H. Kramer & Co., Philadelphia . . . Frank H. Dodge, sales representative in Michigan for Archer-Daniels-Midland Co.'s Foundry Products Division, died in Detroit, Feb. 11. Clinton F. Robinson, formerly assistant to the Secretary of Defense and assistant to the chairman, National Security Resources Board, succeeds H. K. Clark, who resigned recently as president of the Carborundum Co. . . . S. Wyman Rolph, president, Electric Storage Battery Co., has been elected president of the Franklin Institute, Philadelphia . . . H. J. Morrison has been made assistant works manager for Cleveland operations of Aluminum Co. of America.

FOUNDRY SCHOOLS: A "School of Melting" will be conducted this month by the Chicago Chapter, AFS, at the University of Illinois, Navy Pier, Chicago. Steel melting will be covered the evenings of Mar. 10, 17 and 24; gray iron Mar. 11 and 18; malleable iron Mar. 12-13; nonferrous Mar. 14 and 20. Experts in their fields will present the subjects to be discussed. Harry W. Dietert Co. will repeat its sand school program in Detroit, Aug. 11-13, covering the application of practical sand control to foundry operations.

ARWOOD EXPANDS: Arwood Precision Casting Corp., Brooklyn 1, N. Y., has acquired the capital stock of the Metalmold Corp., Derby Conn. This is Arwood's fifth acquisition the last five years. Other plants are operated in Groton, Conn., and Tilton, N. J.

CERTIFICATES OF NECESSITY: Foundries included in latest government approval of rapid tax write-off for new or expanded defense facilities, and amounts involved, are: Superior Steel & Malleable Castings Co., Benton Harbor, Mich., $41,947; Maynard Electric Steel Casting Co., Milwaukee, $36,807; Quality Electric Steel Castings Inc., Houston, Tex., $14,891; Lombard Governor Corp., Ashland, Mass., $32,036; William P. Laytham & Sons Co., Paterson, N. J., $351,349; Hockensmith Corp., Penn, Pa., $210,225; Continental Foundry & Machine Co., Wheeling, W. Va., $200,000; Richmond Foundry & Mfg. Co., Richmond, Va., $40,396; Crane Co., Chattanooga, Tenn., $177,500; Permold Co., Medina, O., $44,864; Allyne-Ryan Foundry Co., Cleveland, $211,832; Oberhelman-Ritter Foundry Co., Cincinnati, $81,608; Pelton Steel Casting Co., Milwaukee, $38,443; General Motors Corp., Danville, Ill., $144,215; Lindgren Foundry Co., Batavia, Ill., $137,386; Gillett & Eaton Inc., Lake City, Minn., $41,479.

FERROUS SCRAP: A recent change in the iron and steel scrap price regulation eliminates hard steel cut 2 feet and under at a $3 premium over the base grade price when sold to gray iron foundries. OPS says the need for this material is not as great as was supposed originally and the premium price resulted in a dislocation in the

movement of scrap. While other ceiling levels are unchanged, a softening in prices of cast grades is accompanying the lessened demand from iron foundries. This is evidenced principally in consumers' ability to obtain supplies from nearby points at low freight rates, instead of incurring heavy delivery charges on shipments from distant areas, as was common several months ago.

NICKEL EXPANSION: An expansion goal to provide anticipated 132,000 tons of nickel from foreign and domestic production has been set for 1954. This would be 31,500 tons more than the 1950 supply, which was made up of 900 tons domestic primary production, 8000 tons of domestic scrap and 91,600 tons imported. Canadian imports are expected to increase from 87,400 tons in 1950 to 106,000 tons in 1954. The Nicaro plant in Cuba, scheduled to come into production this year, is expected to produce about 15,000 tons annually by 1954.

ALUMINUM SCRAP: NPA says it may become necessary to consider direct allocation of aluminum scrap if its recent directive proves ineffective. The directive, limiting scrap receipts by smelters, is intended to provide a more equitable distribution of available supplies. Supplies for smelters this quarter are expected to approximate those of the last quarter of 1951.

SMALL BUSINESS: Small Defense Plants Administration is setting up 13 regional offices to assist in solving defense-induced small business problems and co-ordinating small-business activities of other governmental agencies. Offices will be located in New York, Boston, Philadelphia, Richmond, Atlanta, Cleveland, Chicago, Minneapolis, Kansas City, Denver, Dallas, San Francisco and Seattle. In addition to helping to divert more defense business to small business, the offices are intended to expedite small business loan applications. RFC has a $100 million fund for such loans.

MISCELLANY: Gerity Magnesium Corp., subsidiary of Gerity-Michigan Corp., Adrian, Mich, has started production of magnesium sand castings, specializing in parts for aircraft engines . . . Applications for third quarter allotments of steel, copper and aluminum under CMP are due to be filed by Mar. 1 . . . Program to increase the U. S. annual supply of zinc to 1,320,000 tons by 1955, against 1,093,000 tons in 1950, is under way . . . Ferrous scrap consumption in 1951 was 68½ million gross tons, largest in history, the Bureau of Mines reports. Nearly one-half was purchased scrap, also a record . . . Shipments of steel shot and grit in 1950 totaled 144,333 tons, according to a government survey.

PRICES OF FOUNDRY METALS AND COKE

(As of Feb. 26, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$17.00-18.00
New River	21.30
Wise County	15.95
OVEN	
Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.80
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$54.50	$55.00
Birmingham	48.88	....
Buffalo	52.50	53.00
Chicago	52.50	52.50
Cleveland	52.50	52.50
Everett, Mass.	57.50	58.00
Fontana, Calif.	58.50	....
Geneva, Utah	52.50	....
Granite City, Ill.	54.40	54.90
Lone Star, Tex.	48.50	48.50
Neville Island (Pittsburgh)	52.50	52.50
Steelton, Pa.	54.50	55.00
Swedeland, Pa.	56.50	57.00
Toledo, O.	52.50	52.50
Troy, N. Y.	54.50	55.00
Youngstown, O.	52.50	52.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5 —27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 19.00c. Secondary No. 12 alloy 19.50c. Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.61½c, delivered.

ZINC: High grade 20.85c, delivered. Die casting alloy 23.65c-24.25c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. *Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

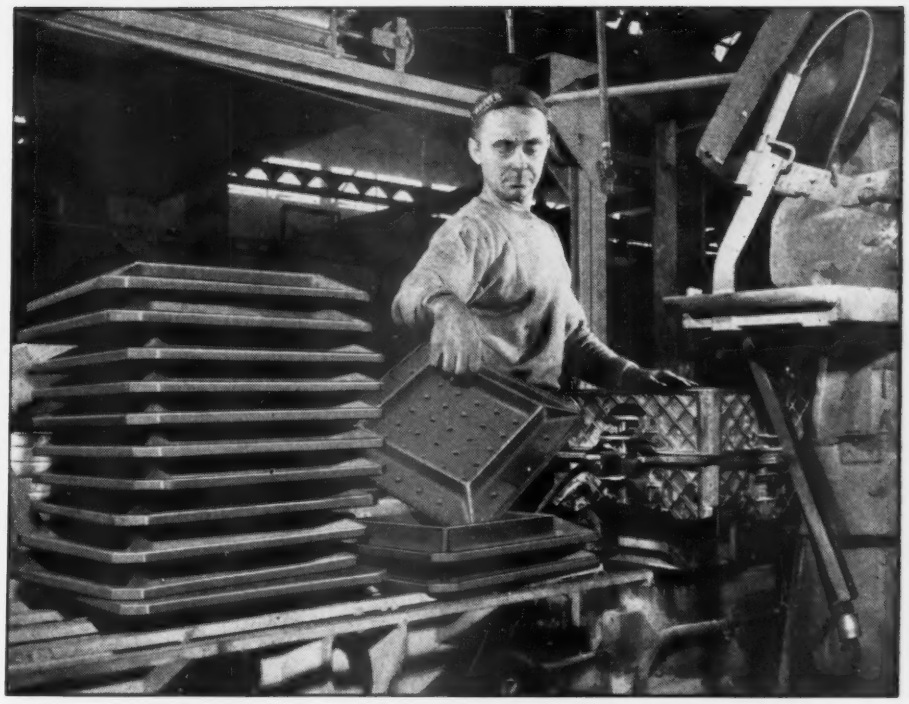
CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

"Burning and Breakage loss not a factor since using EDCO Dowmetal BOTTOM BOARDS"

...says Olney Foundry, LINK-BELT COMPANY, Philadelphia, Pa.



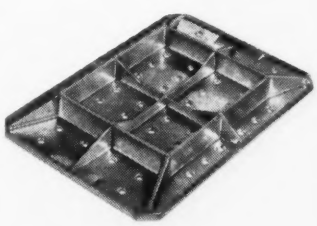
Modern mechanized foundries, like Olney Foundry, rely on the durability of EDCO DOWMETAL Bottom Boards. Even after 3 years of constant use, the EDCO DOWMETAL Bottom Boards at Olney Foundry continue to give maximum production efficiency. That's why Olney Foundry says with confidence: "Burning and breakage loss not a factor since using EDCO DOWMETAL Bottom Boards".

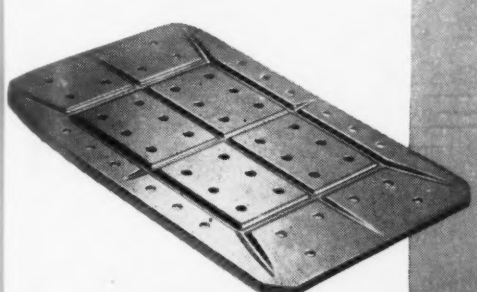
EDCO DOWMETAL Bottom Boards also help produce castings that are true to pattern. The exclusive grooved and vented design permits escape of gasses, and insures mold stability. Causes for rejects are kept to a minimum.

"EDCO DOWMETAL Bottom Boards are now permanent equipment in our foundry", adds Olney Foundry. "They help increase output while cutting production costs, and have more than paid for themselves in savings alone effected by substantially reduced replacement costs."

Regardless of the size of your foundry operation, your molders will like handling these boards because they are strong—yet light in weight, easy to stack, and do not splinter. EDCO DOWMETAL Bottom Boards will not warp or rot—there are no nails to come out, nothing to break or split—no upkeep.

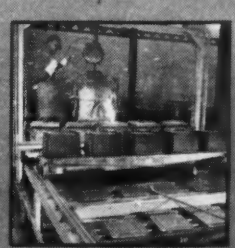
Write us, or phone CApitol 7-2060 for price schedule and list of 74 standard sizes available from stock.





Olney Foundry was established in 1920 as a division of Link-Belt Company in Philadelphia, Pa. Olney Foundry produces gray iron castings of every description ranging in size from a few ounces to ten tons in weight. EDCO DOWMETAL Bottom Boards have been extremely helpful in maintaining the high degree of modern mechanization characteristic of Olney Foundry.

The illustrations at right show some of the foundry production equipment used by Olney Foundry to achieve their high degree of modern mechanization. The pallet-type gravity conveyor in the top panel shows molds on EDCO DOWMETAL Bottom Boards being moved to the pouring area. This pouring area is shown in the lower panel. The molds are automatically dumped after pouring and the EDCO DOWMETAL Bottom Boards are returned by the conveyor to the molder.



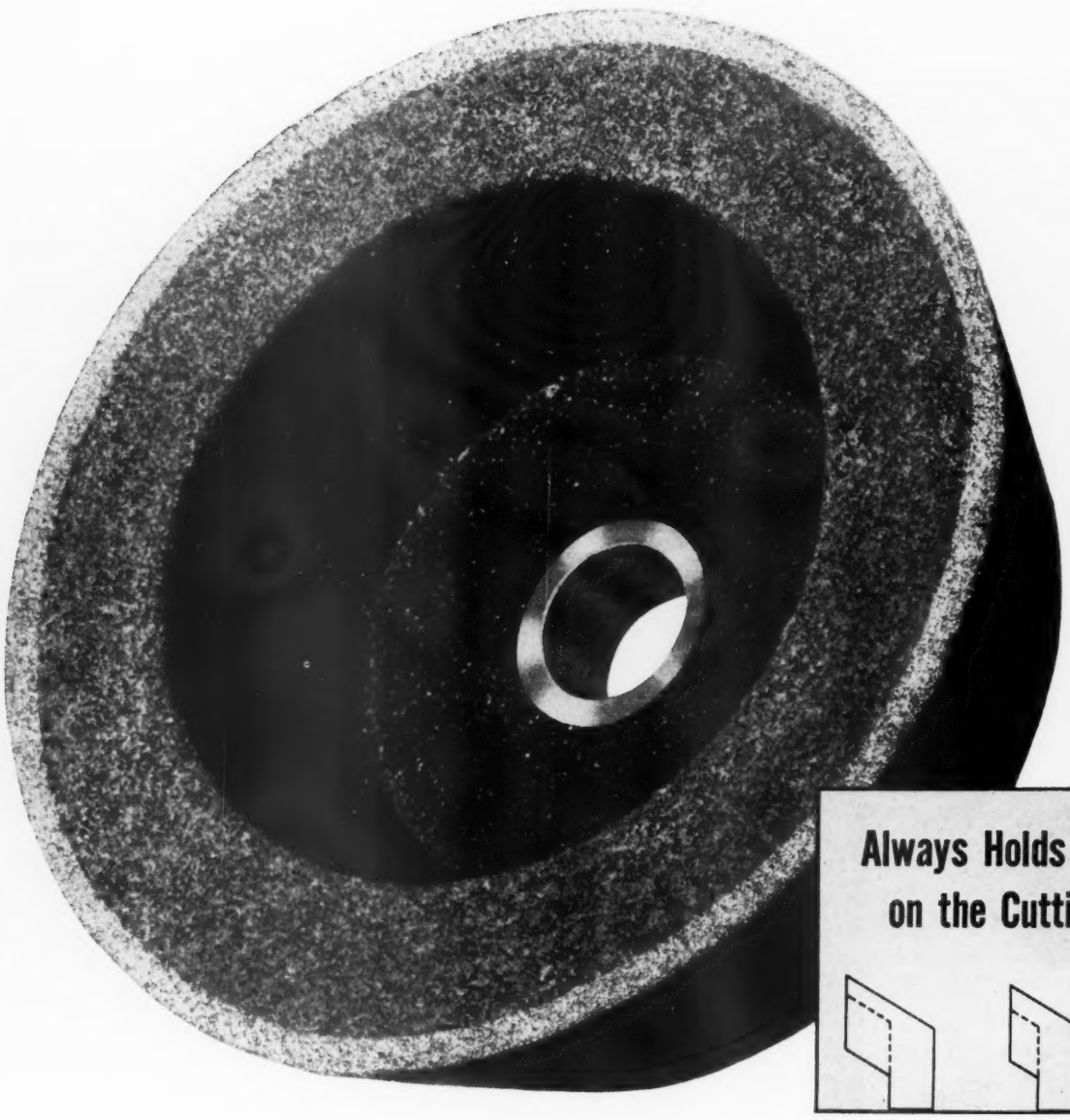
EDCO CHRISTIANSEN CORPORATION

CHRISTIANSEN CORPORATION

1517 N. KILPATRICK AVE. • CHICAGO 51, ILLINOIS

ALUMINUM ALLOY INGOTS • ZINC BASE DIE CASTING ALLOYS

How U.S. Rubber improved cup wheels



Always Holds its Shape on the Cutting Edge

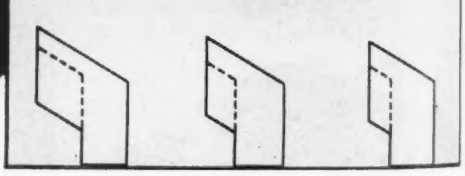


Diagram shows how the grinding face wears down evenly and the outer cutting edge remains sharp

"U.S." technicians put an encircling rim, extra-tough and wear-resistant, around the free-cutting face of this Royalite® Hard-Shell Cup Wheel. As a result, the cutting edge does not become rounded. Hard-to-reach corners can be accurately ground because the edge does not break down. This free-cutting resinoid cup wheel retains its "true" shape throughout its entire service life.

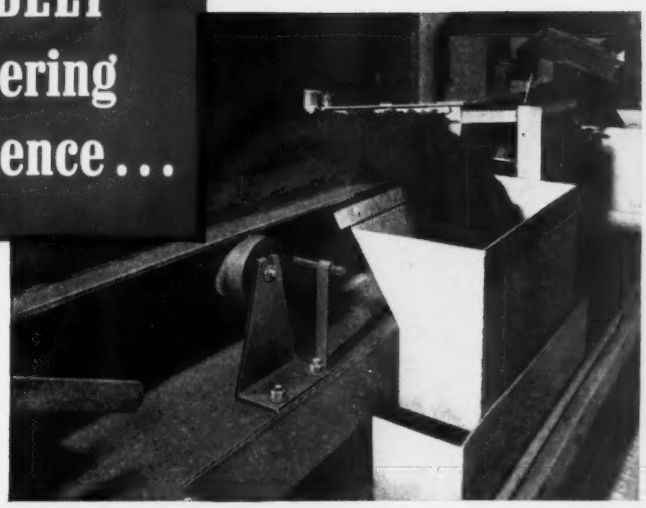
Over 89 years' experience in the abrasive industry enables United States Rubber Company to solve all types of grinding problems. "U.S." engineers are always available for consultation. Write to address below.

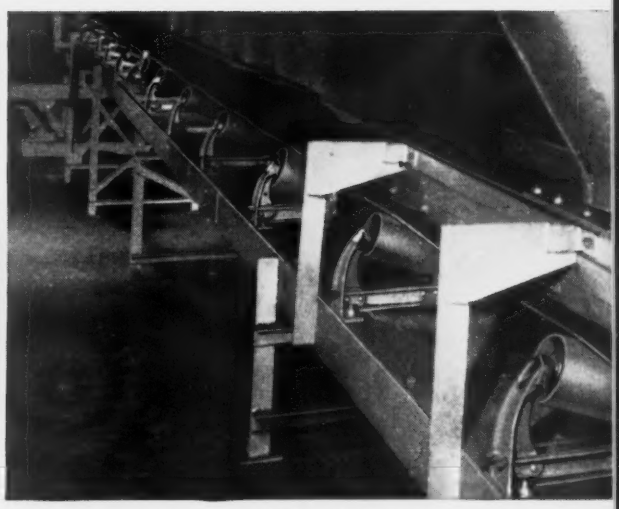
PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

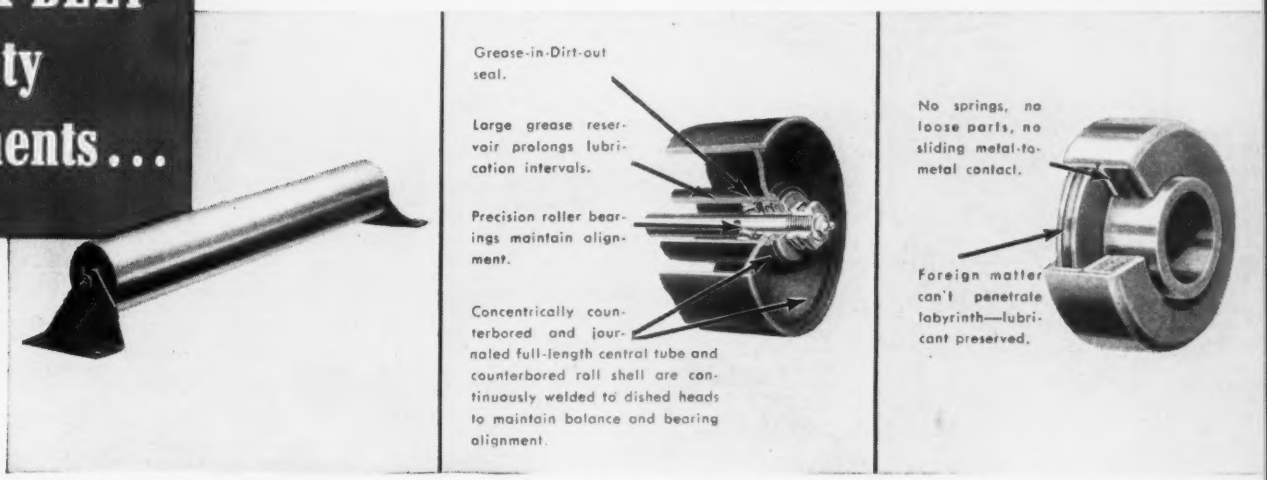
LINK-BELT engineering experience...





Left: Sand is distributed to molders' hoppers by means of Link-Belt Belt Conveyor employing flat roll idlers. *Right:* Spill-sand is carried on troughed conveyor in tunnel under line of molding machines.

plus LINK-BELT quality components...


Grease-in-Dirt-out seal.
Large grease reservoir prolongs lubrication intervals.
Precision roller bearings maintain alignment.
Concentrically counterbored and journaled full-length central tube and counterbored roll shell are continuously welded to dished heads to maintain balance and bearing alignment.
No springs, no loose parts, no sliding metal-to-metal contact.
Foreign matter can't penetrate labyrinth—lubricant preserved.

Roller bearing L-B Flat Belt Idler. Less lubricant and adjustment. Grease-in-Dirt-out Seal.

add up to your best buy in BELT CONVEYORS

In foundries all over the world, LINK-BELT Belt Conveyors provide reliable, efficient sand handling

OBTAIN the finest in modern sand handling in your foundry. It can be as simple as calling in a Link-Belt foundry specialist while you're still in the planning stage.

Thousands agree Link-Belt builds the finest belt conveyors on the market today. And it has the most complete line of components—all types and sizes of idlers, take-ups, pulleys, plows, bearings and power transmission drives—plus related equipment, including trolley, oscillating and mold conveyors, shakeouts and other sand handling machinery.

Equally important, Link-Belt foundry specialists draw on the broadest background in the industry. They'll work with you and your consultants — help you come up with the right layout for your requirements.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,528

LINK-BELT

CONVEYORS and PREPARATION MACHINERY

The beeswax with which honeycombs are built is a product of digestion. The worker bee has a series of wax pockets on the lower part of her abdomen. When bees gorge themselves with honey and gather in dense masses, they produce and maintain a high temperature, and minute scales of wax begin to appear in their wax pockets. Comb building begins and a bit of shapeless wax shows the start of the comb. Bit by bit it grows, each worker in turn laying down her portion—like masons bringing bricks to lay a wall. Soon cells begin to take shape, the entire comb growing so gradually that it appears like the bursting of a leaf from a growing bud.

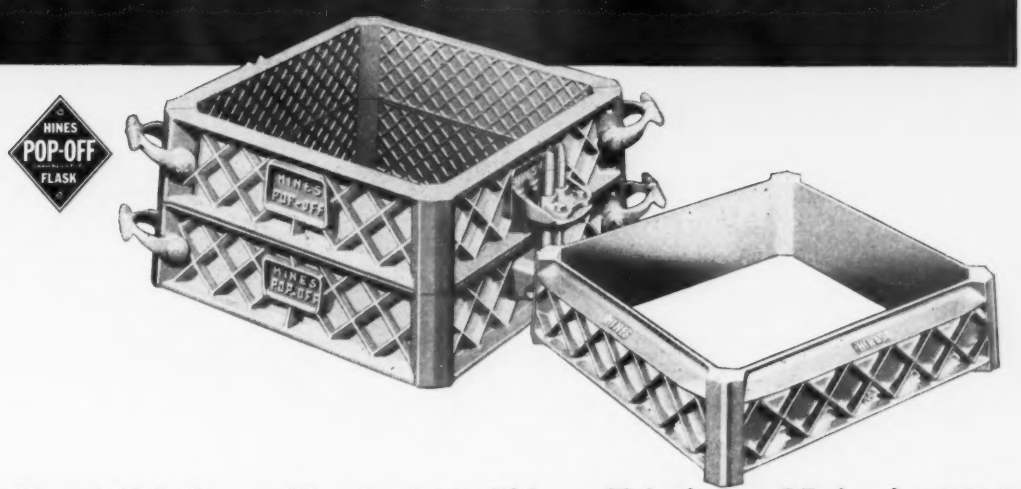
ecision

It's amazing that the walls of a honeycomb, only .002″ to .003″ in thickness, will support such weight as combs must do when filled with honey. The answer is in the hexagonal design of the cells and the *precision* with which each cell is fitted to the other.

To meet the demands of modern foundry production, HINES FLASKS and JACKETS, too, are designed and built with the utmost precision. They're assembled around dies to insure absolute uniformity, so that when the flask is removed from a mold, the jacket fits it like a glove. Perfect teamwork . . . for trouble-free production.

HINES precision is well known to foundrymen. That's why you'll find more HINES FLASKS and JACKETS than any others in leading foundries. If you're not using them now, why *aren't* you?

HINES FLASKS AND JACKETS



e Hines Flask Co., 3431 West 140th Street, Cleveland 11, Ohio • Telephone: ORchard 1-2806

DELTA NO-VEIN COMPOUND

EVERY DELTA Foundry Product is backed by continuing and exhaustive laboratory research to safeguard quality and maintain absolute uniformity. From raw materials to the finished product manufacturing processes proceed under an automatic and persistent policy of laboratory control.

Ends VEINING AND METAL PENETRATION IN YOUR CORE SAND MIXES

DELTA FOUNDRY PRODUCTS CUT PRODUCTION COSTS

CORE AND MOLD WASHES:

FOR ALL TYPES OF SAND CAST METALS: STEEL, GRAY IRON, MALLEABLE AND NON-FERROUS.

- PARTING COMPOUNDS
- MUDDING & PATCHING COMPOUNDS
- NO-VEIN COMPOUND
- MOLD SURFACE BINDERS — LIQUID
- PERMI-BOND
- DRI-BOND *(DRY BINDER)*
- BONDITE
- 96-B SAND RELEASE AGENT
- CORE ROD DIP OIL NO. 224X
- SAND CONDITIONING OIL
- CORE OILS

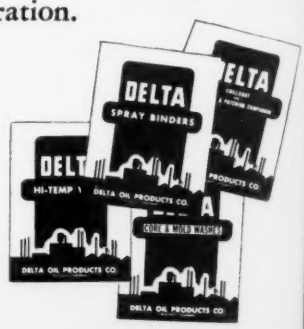
Add only a small quantity of DELTA NO-VEIN COMPOUND (1% to 3% maximum) to your core sand and eliminate troublesome veining of cores.

DELTA NO-VEIN COMPOUND is a specially prepared and compounded series of oxides which develop the necessary plasticity and hot strength without, in any way, deteriorating the sand.

DELTA NO-VEIN COMPOUND retards sand grain expansion, practically eliminating the possibility of metal penetration.

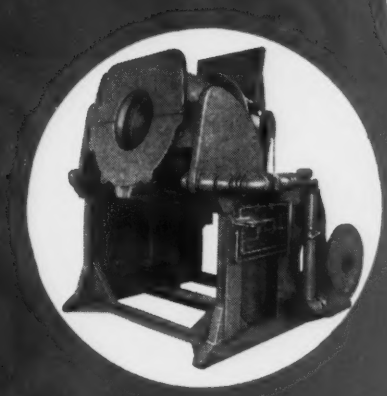
Get the Facts...

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

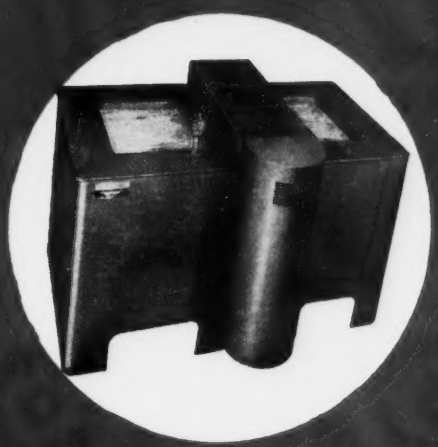


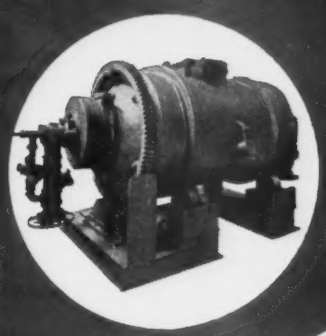
DELTA OIL PRODUCTS CO.

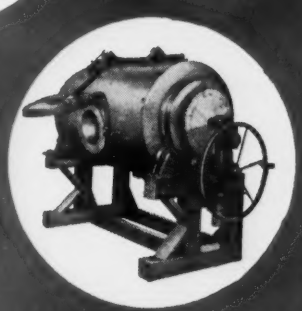
MILWAUKEE 9, WISCONSIN

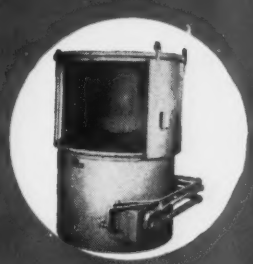


MELTING AND HOLDING FURNACES









Lindberg-Fisher builds all kinds of melting and holding equipment . . . gas . . . oil . . . electric . . . induction . . . arc and high frequency. Lindberg-Fisher engineers can intelligently and without prejudice recommend the proper type of furnace to best suit your needs and conditions.

Bulletin 551 covers the complete melting line. Write for your copy today.

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Are Your Jackets...

"Stubborn as a Mule?"

Change to CMD SLIP JACKETS

RIGID CONSTRUCTION

C M D Slip Jackets up to 8" deep have single reinforcement angle irons. Deeper jackets have double reinforcement angle irons (as shown here).

They Strip Clean from the Mold Every Time!

Because CMD Non-Burn Slip Jackets don't stick, but slip easily from the mold, they save time and prevent damage to the molds. Made of Monasbestos one-half inch thick, they won't burn—outlast ordinary jackets many times. Available straight or tapered. Order now!

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CHICAGO MANUFACTURING & DISTRIBUTING CO.
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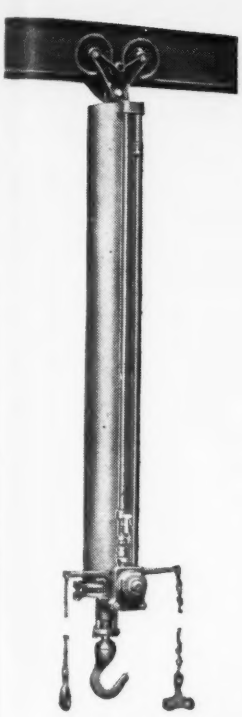

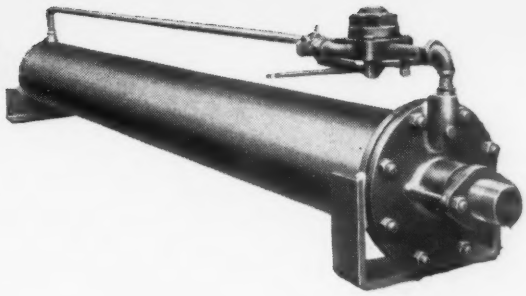

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—For low-cost handling of materials, machines or component parts

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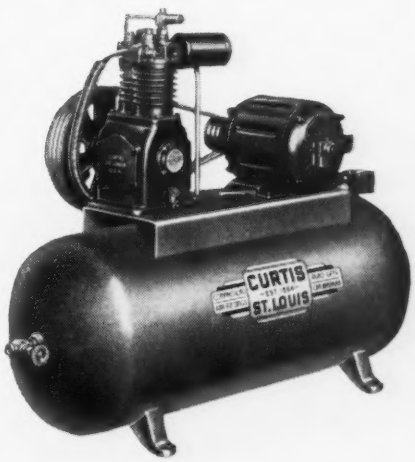
Choose a CURTIS AIR COMPRESSOR FOR INDUSTRIAL APPLICATION

Model C Water-Cooled Compressor, Up to 50 H. P. Fully Enclosed—Dust and Dirt-proof—Carbon-Free Valves, Timken Bearings.

Curtis Model F Air Compressor, Up to 10 H. P., Portable or Stationary.



All Curtis equipment is precision made from top quality raw materials.

MAIL coupon below for additional information. I-51-2R

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98 Years of Successful Manufacturing

CURTIS PNEUMATIC MACHINERY DIVISION *of Curtis Manufacturing Co.*
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a "mechanic's eye view" shows why TOWMOTOR *costs less to maintain*

You don't have to work on lift trucks long before you learn the things that are important for low-cost maintenance: Things like easy accessibility . . . a dependable, *industrial* type motor . . . double universal joints that soak up shocks instead of passing them along to transmission and crankshaft bearings. You learn to appreciate a highly accessible clutch and transmission . . . and a degasser that *really* means business.

You'll find all those "mechanic's" features in Towmotor. And wherever you put your Towmotor to work, you can be sure of obtaining genuine, *packaged* Towmotor replacement parts, to keep your Towmotor on the job year in and year out. Towmotor Corporation, Div. 75, 1226 E. 152nd Street, Cleveland 10, Ohio.

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THE ONE-MAN-GANG

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Representatives in all principal cities in U. S. and Canada.

HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT **AMERICANISM** TODAY?

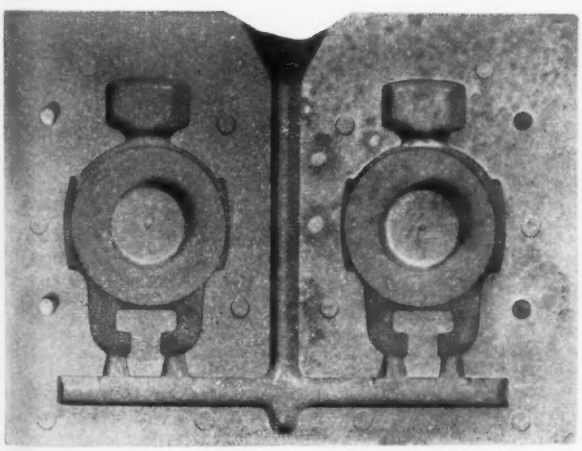
New help for foundries...on shell molding

1 Have you taken advantage, yet, of Monsanto's recently-announced evaluation plan that helps you *test* Shell Molding—with a minimum of time and expense? All that's necessary is that you first write us for pattern requirements—then send us one of your patterns. We'll make several shell molds from your pattern, and return them to you so you can make experimental castings with your conventional casting equipment.

The evaluation plan is one of *two* important parts of Monsanto's year-'round research on foundry resins and Shell Molding.

Now—another new development from the Monsanto laboratories

2 Monsanto application-research has developed a new *dust-suppressant*—to give you better dust-control. A small percentage of the new suppressant added to the resin-sand mixture eliminates or greatly reduces dusting. This means improved working conditions . . . higher employee morale . . . increased plant efficiency.



Note less segregation of resin and sand when Monsanto's dust-suppressant is used. Both sides of this shell were made in same investment box with the same Resinox resin, but resin in left half had dust-suppressant added.

For full information on Monsanto's new dust-suppressant . . . for pattern detail requirements to assist you in preparing a suitable pattern for mold testing . . . and for data on research-built Resinox phenolic resins used in Shell Molding and core binding . . . use the handy coupon today! Resinox: Reg. U.S. Pat. Off.

MONSANTO
CHEMICALS AND PLASTICS
SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Plastics Division,
Room 5708, Springfield 2, Mass.

Please send me information on: ☐ New dust-suppressant; ☐ Resinox resins. ☐ I would like to investigate the Shell Molding Process. Please send pattern requirements.

Name & Title _____

Company _____

Address _____

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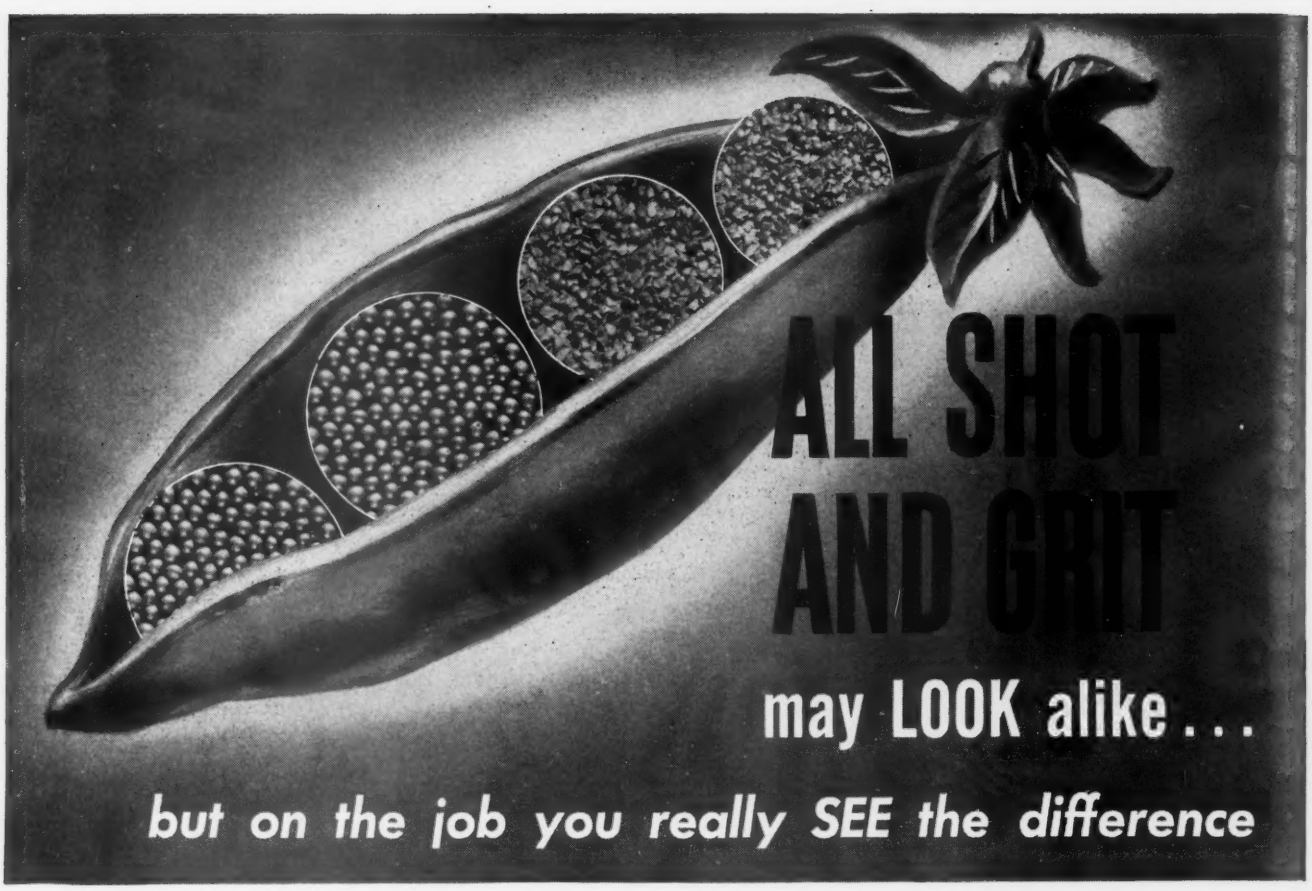


TO ALL outward appearances any two grades of shot or grit may appear to be as much alike as peas in a pod—but there the similarity ends. Rarely do they perform alike.

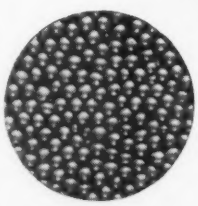
In using HI-GRADE Shot and Grit you'll find there IS a difference . . . a recognizable value far beyond purchase price that shows up in extra performance on the job.

Though you may be satisfied with the material you are now using, it is just good business not to deny the promise of uniform, lower cost, more efficient blast-cleaning which HI-GRADE Shot and Grit can fulfill for you.

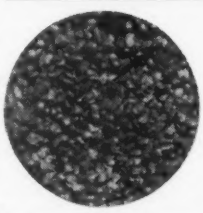
You can't be blamed for wanting longer use-life in the abrasives you use—more efficient cleaning and peening—a better finish in less time. Get these advantages with HI-GRADE Shot and Grit. Requisition a trial quantity today. You'll never regret it.

Packed in 100 lb. Bags—Ready for Immediate Shipment

METALLIC
SHOT HI-GRADE GRIT



HI-GRADE SHOT
UNIFORM SIZE AND HARDNESS
Withstands repeated strain, stress and wear. Exclusive alloying and tempering process helps prevent rust; minimizes impact fractures.



HI-GRADE GRIT
SHARP, TOUGH AND DURABLE
Made of same material and processed by same methods as Hi-Grade Shot. Cleans with maximum efficiency. Reduces equipment wear and maintenance costs.

HI-GRADE SHOT AND GRIT MORE THAN MEETS S.A.E. SPECIFICATIONS—SCREENED AND GRADED FOR 100% USAGE

Clayton-Sherman *Abrasives Company*

MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

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SIMPLICITY

model V-S conveyors help speed production and cut costs of handling hot foundry sand

At a foundry producing a variety of malleable iron castings, this 36" x 30' Simplicity Model V-S Conveyor moves hot sand from two shakeouts up a 3° incline to an elevator at an average rate of 80 tons with a peak load of 120 tons per hour. As the sand moves along the conveyor, water is added and plows turn the sand thus reducing the sand temperature 100°. The sand is discharged into the elevator boot over a permanent magnet that removes all metal particles.

Simplicity Conveyors and Os-A-Veyors greatly simplify the movement of sand and castings and hot abrasive materials in foundries. They can be installed to carry most any type or quantity of material you need. Simplicity Conveyors and Os-A-Veyors are easy and inexpensive to operate, maintain and repair.

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- Sales representatives in all parts of the U. S. A.
- FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario
- FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, New York

Simplicity
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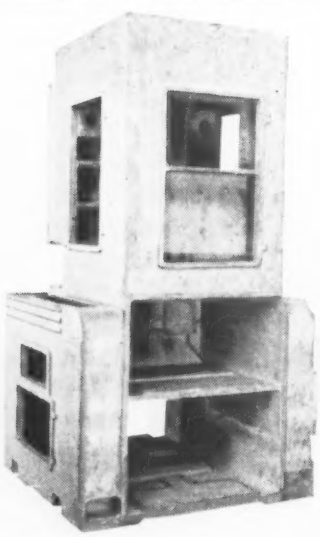
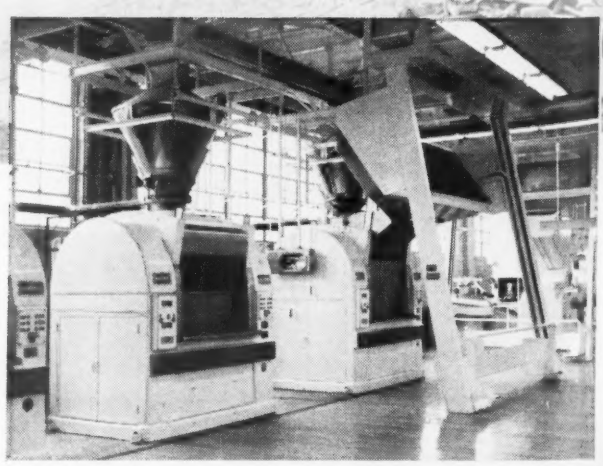


Above: *The electric furnace section of Baker Perkins foundry at Saginaw, Michigan. Left, Type LFA, 350 lb.; right, Type AA, 1000 lb.*

Left: *Casting for machine tool base, produced by Baker Perkins.*



A battery of Baker Perkins dough mixers, one equipped with dough trough elevator. Baker Perkins also manufactures mixing machinery used in processing of candy, chewing gum, cold creams, paints, soap, tooth paste, and many other products.

enough to vote!

These 22 year old Detroit ROCKING Electric Furnaces produce high-quality iron melts every working day...

Baker Perkins, Inc., makes bakery machinery and chemical mixing machinery, and produces castings for other manufacturers. To supply the company's needs for a variety of special iron and steel melts, there are two Detroit Rocking Electric Furnaces in the foundry.

These two furnaces are 22 years old, and they still turn out efficient melts of nickel irons and steels day after day.

Precise control of analysis is one of the outstanding characteristics of Detroit Electric Furnaces. The melt is completely homogeneous because of the rocking action. There's no carbon pick-up from electrodes, since they are free of the bath at all times.

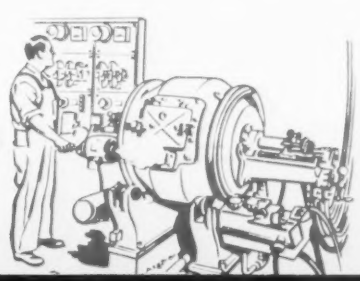
Temperature control is extremely accurate, too. A desired melting cycle can be established and closely followed through melt after melt, resulting in fast, most efficient operation.

Detroit Rocking Electric Furnaces bring economies to the foundry floor through optimum use of power, minimum heat loss, less metal shrinkage, more heats per working days, reduced out-of-production time because of longer refractory wear and easy shell replacement.

Furnace capacities—for ferrous and non-ferrous melting—range from 10 to 4000 pounds, and are individually designed to meet your plant's electrical specifications.

Get the advantages of Detroit Rocking Electric Furnace operation in your plant. Outline your operating needs and we'll show you how these furnaces can help you. Write today!

Faster melts, better melts



ROCKING ACTION DOES IT!

DETROIT ELECTRIC FURNACE DIVISION

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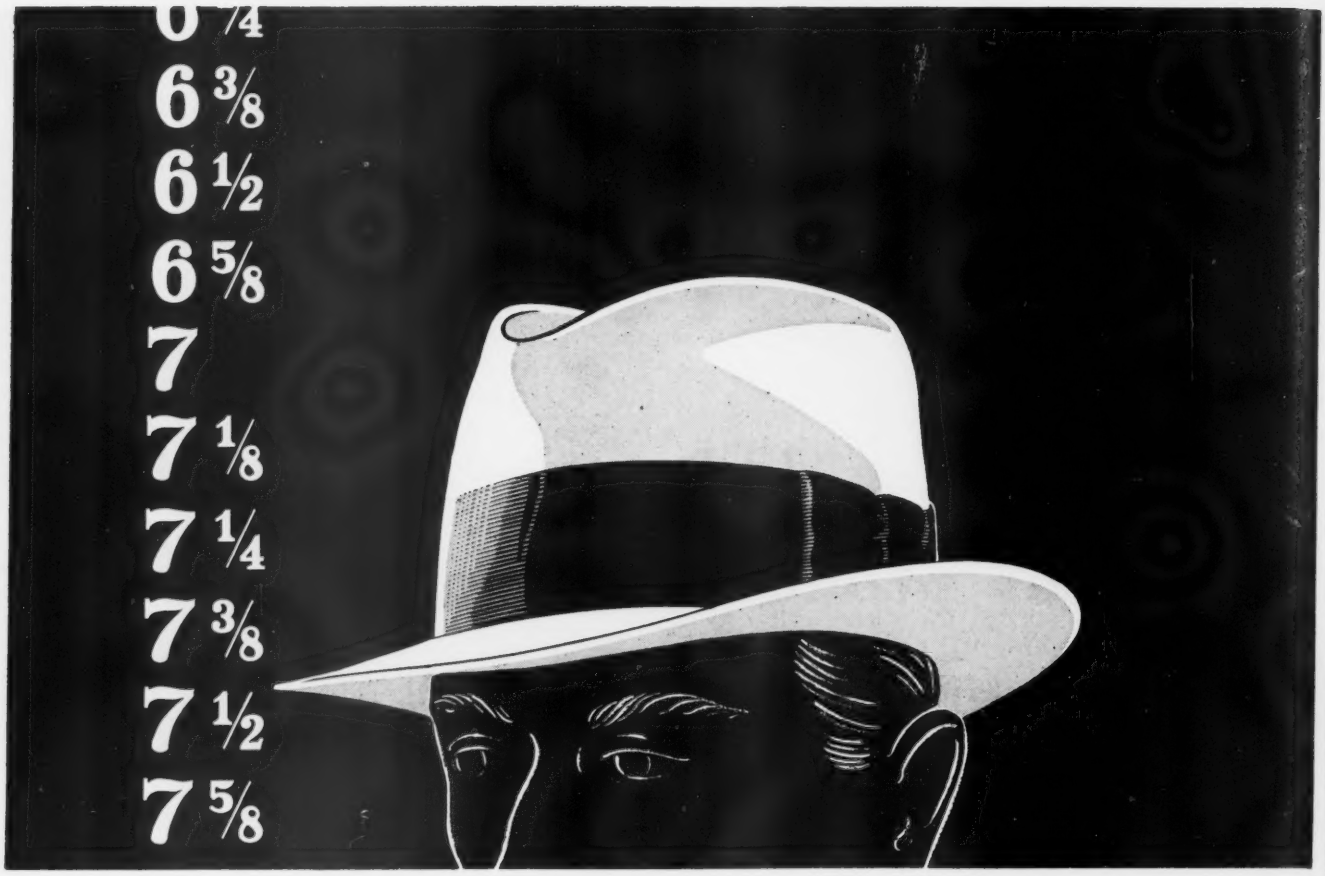

WHAT'S *Your* HAT SIZE?

When you buy a hat you buy it to fit. Doesn't it make good sense to buy an annealed shot and grit made to fit YOUR blastcleaning problems—exactly?

If your blastcleaning problem is such that annealed abrasives are the most economical—obviously, that is what you will use. However, it is just as obvious that there is a great deal of difference between just polishing a surface, or removing light sand and scale or removing imbedded sand and cutting—however slightly—into the surface. These three different blastcleaning problems CANNOT BE SOLVED, with equal economy, with ordinary annealed shot and grit. The annealing must be CONTROLLED—the hardness range must be held within narrow limits and within the range best suited to the operation . . . or the greatest economy of operation will not be achieved.

It so happens that Permabrasive Shot and Grit *IS* made in three different hardness ranges with a narrow range of hardness in each. Permabrasive is different because, 1., it is made from *controlled* raw materials of the proper chemical composition to respond UNIFORMLY to heat treating and, 2., because uniform, pellet for pellet, annealing with a new CONTINUOUS process produces assured results. Thus, like buying a hat to an exact head size, you can now buy annealed abrasives to fit your own blastcleaning problem.

There is no obligation involved in having us determine your exact needs. If we can show you even greater savings over your present use of annealed abrasives you're bound to profit. If we can't, you have only lost a three-cent stamp. Please write your name and address on the coupon below and send it to the Hickman, Williams office nearest you. We'll do the rest.

PERMABRASIVE* SHOT AND GRIT *IS PRODUCED EXCLUSIVELY BY*

NATIONAL METAL ABRASIVE COMPANY · CLEVELAND, OHIO

AND SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & COMPANY

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PHILADELPHIA · PITTSBURGH
INDIANAPOLIS

OK. You may determine our "size" in annealed abrasives, without any obligation on our part, of course.

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Firm_____

Address_____

City_____

MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

*Licensed under
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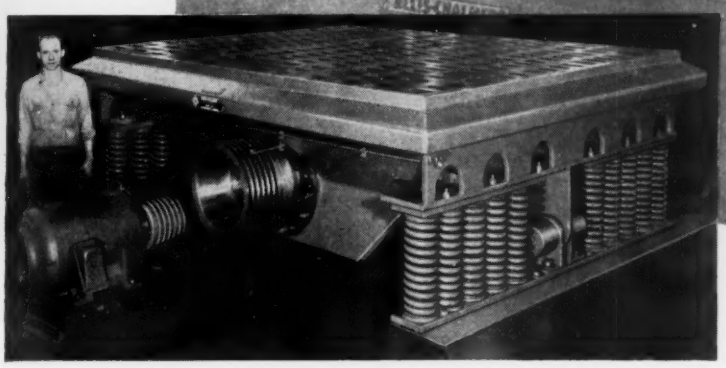
U. S. Application No. 619602

"FOUNDROMATIC" SHAKEOUTS



Heavy body of structural and plate steel is completely stress relieved before machining. Heavy cast steel snubbers keep body centered on durable coil support springs even if side loaded. Pivoted motor base design, coordinated with *Texrope* drive, provides trouble-free operation.

PRODUCTION WAS SPEEDED 96-FOLD at this mid-western steel foundry when the *Foundromatic* shakeout shown was installed! Crane bases are cored out completely in about *five minutes* . . . as compared with an average of *eight hours* required with manual labor.

The *Foundromatic* shakeout, an exclusive and field-proven Allis-Chalmers design, will also radically reduce *your* foundry shakeout and core knockout time. You'll get increased output for these three reasons:

Slash Knockout Time!

1 FASTER SHAKING OUT. Heavy body construction, with decks of 1½ to 2 in. plate steel, gives more "punch" to full load operation.

2 MORE FLOOR SPACE. Shakeout can break up molds as soon as castings are cool, leaving floor area free for re-use.

3 UNINTERRUPTED OPERATION. Rugged two-bearing vibrating mechanism has oversize bearings carrying only eccentric shaft force. And there is no record of shafts or support springs ever breaking.

Get the full story on *Foundromatic* shakeouts, their proven construction features, and how they can benefit *your* foundry operations. Single units built in capacities from one to 25 tons . . . multiple units available to over 100 tons. Call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletins 07B7532 and 07B6365A.

A-3612

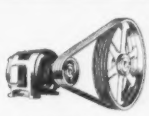
ALLIS-CHALMERS

Foundromatic, Texrope and Regulex are Allis-Chalmers trademarks.

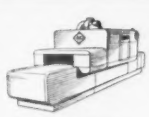
Foundry Equipment for Bigger Output—Better Working Conditions!

Vibrating Screens

Cupola Blowers

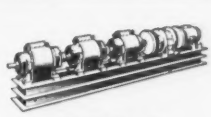


Motors-Drives Control



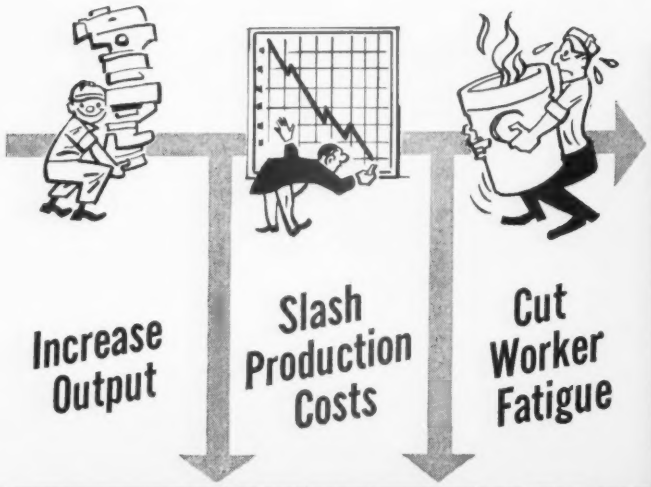
Foundromatic Core Dryer

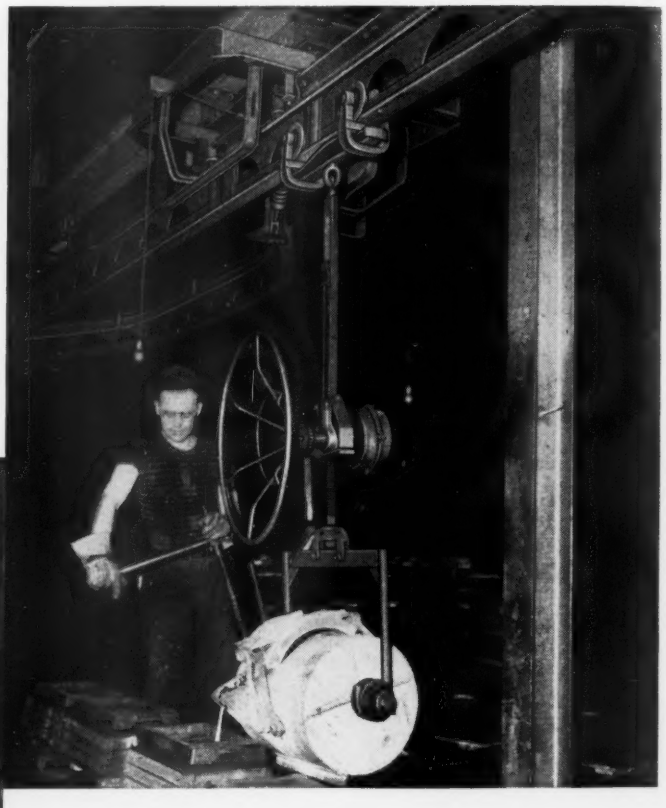
Induction Heating & Melting



Regulex Arc Furnace Control

Convey Hot Metal *the Efficient* Tramrail Way





THE advantages that a Cleveland Tramrail System bring to a foundry are so outstanding that the results are often little less than phenomenal. Wherever the equipment is installed, efficiency usually spurts upward an exciting amount.

This is very evident in the handling of hot metal. Large ladle-fulls can be taken directly from cupola to molds without in-between transferring. This means fewer trips and faster pouring. Heat loss is greatly reduced. The work is safer and easier because it is simply a matter of guiding the smooth-rolling overhead carriers.

The same overhead trackage can be used for most other handling: Patterns, cores, sand, flasks, castings, etc. and save time and worker fatigue on every lift and move.

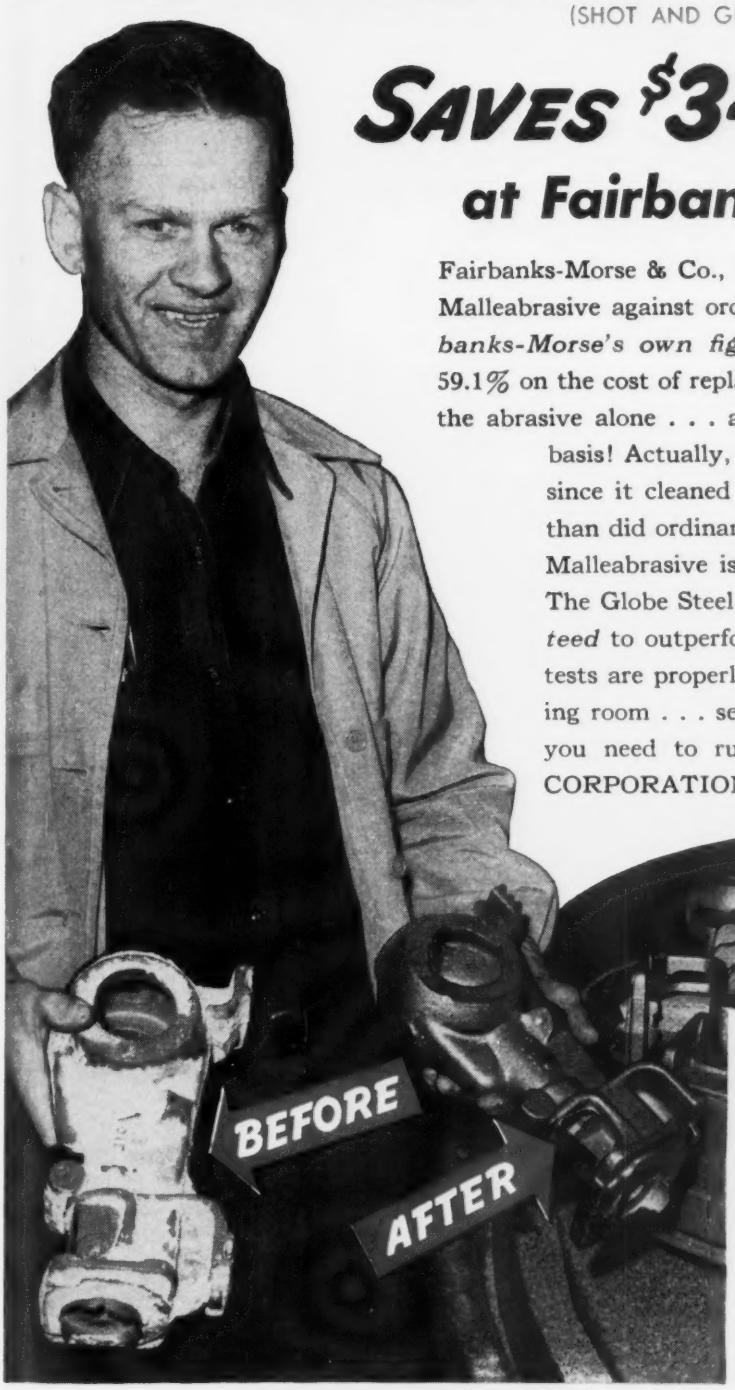
GET THIS BOOK!
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3833 East 286th St. Wickliffe, Ohio.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

MALLEABRASIVE®*

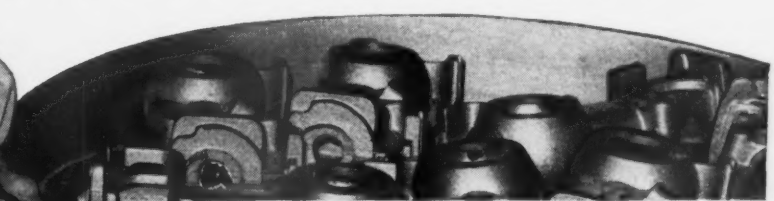
(SHOT AND GRIT)



SAVES $3450.00 A YEAR at Fairbanks-Morse & Co.

Fairbanks-Morse & Co., Freeport, Ill., took us up on our offer to test Malleabrasive against ordinary grit in their own shop. Here are *Fairbanks-Morse's own figures:* During the test, Malleabrasive saved 59.1% on the cost of replacement parts . . . saved 14.6% on the cost of the abrasive alone . . . adding up to a total of $3454.40 on a year's basis! Actually, Malleabrasive's advantages are even greater, since it cleaned an average of 10.8% more tonnage per hour than did ordinary grit!

Malleabrasive is the *original* long-life abrasive pioneered by The Globe Steel Abrasive Co., Mansfield, Ohio. It is *guaranteed* to outperform ordinary shot and grit when comparative tests are properly run. Test Malleabrasive in your own cleaning room . . . send for your free kit, containing all the forms you need to run this impartial test. Write: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.



Here's why Malleabrasive saves you money:

MALLEABRASIVE

- *is designed for modern cleaning equipment*
- *wears out fewer machine parts*
- *lasts 2 to 4 times longer*
- *reduces machine down-time*
- *reduces cleaning costs up to 50%*
- *increases output of cleaned castings*

Packed in orange striped 100-pound bags with this tag

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

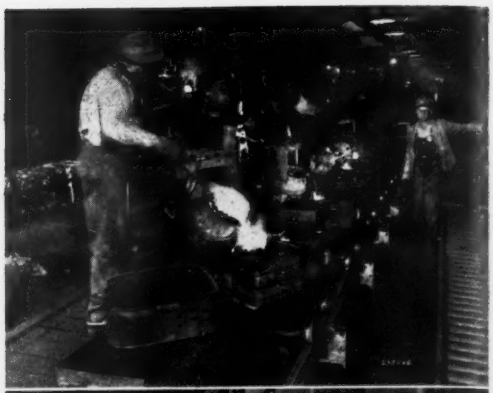
Pangborn

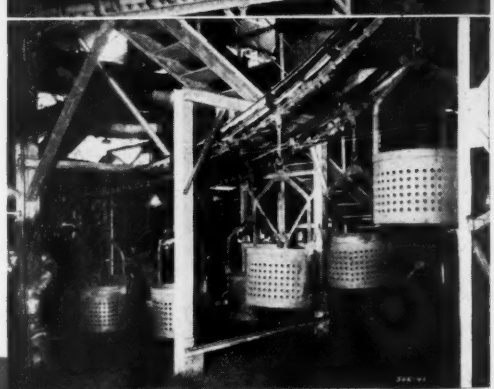
BLAST CLEANS CHEAPER
with the right equipment for every job

*U. S. Patent #2184926 (other patents pending)

CALL FOR A JEFFREY *ENGINEER*

He's a Specialist





Yes, Jeffrey Foundry Engineers know their business . . . they have designed and equipped some of the largest foundries in this country. At the same time, they do not lose sight of the fact that small foundries need mechanized equipment to do a better job economically. They serve both—constructively.

You can put your modernization program squarely up to Jeffrey Foundry Sales Engineers. They will be glad to submit recommendations . . . to help you mechanize for profit. Photos shown here depict just a few of the large jobs engineered and erected by Jeffrey. Names upon request. Let us hear from you—if you want the right answers.

Aerators
Flask Fillers
Mold Conveyors
Feeders
Screens
Transmission Machinery
Bucket Elevators
Crushers
Sand Preparation Equipment
Sanditioners
Apron & Belt Conveyors

THE JEFFREY MANUFACTURING COMPANY

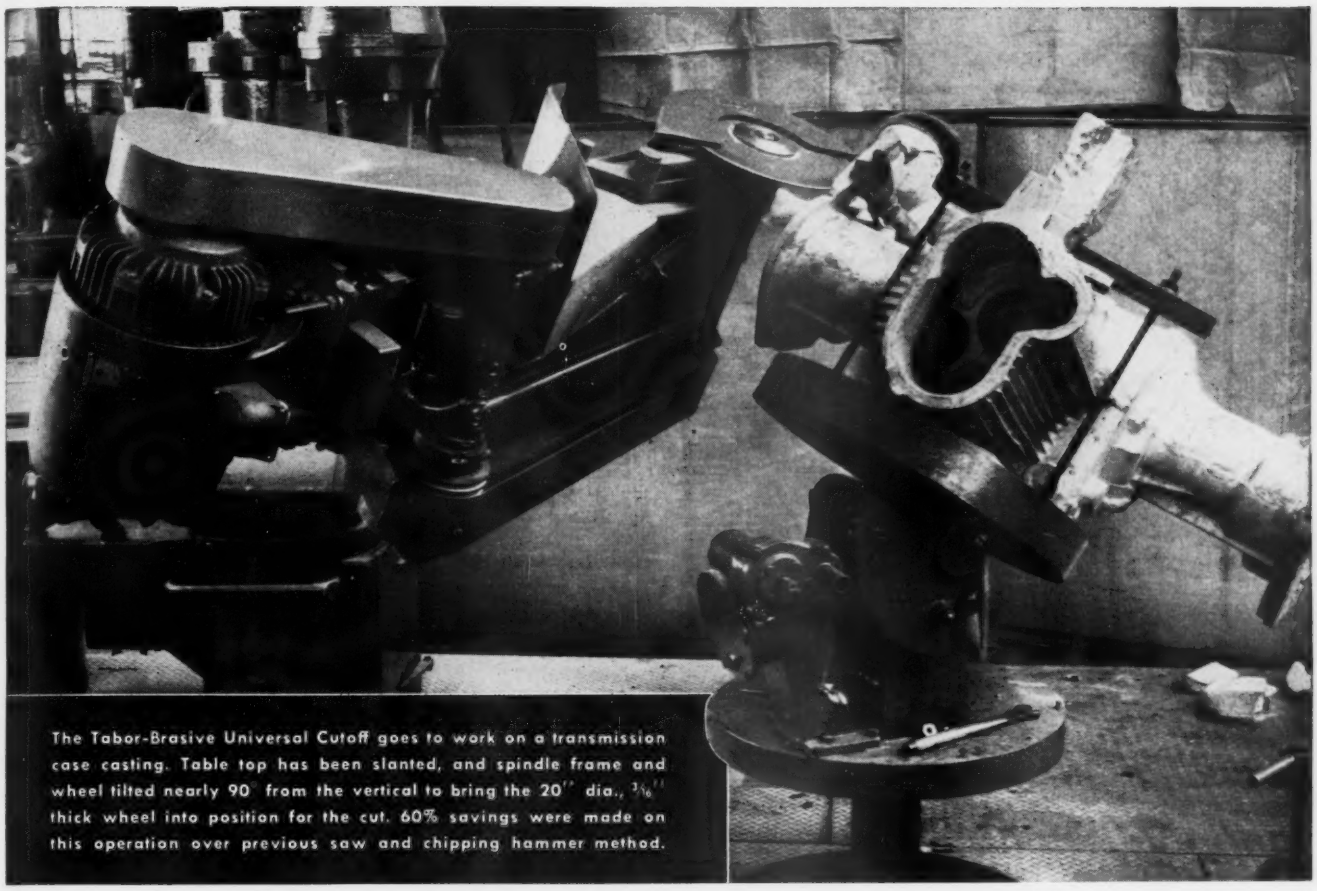
ESTABLISHED 1877

907 North Fourth St., Columbus 16, Ohio

Baltimore 2 · Beckley, W. Va. · Birmingham 3 · Boston 16 · Buffalo 2 · Chicago 1 · Cincinnati 2 · Cleveland 15 · Denver 2 · Detroit 13 · Forty Fort, Pa. · Harlan, Ky. · Houston 2 · Jacksonville 2 · Milwaukee 2 · New York 7 · Philadelphia 3 · Pittsburgh 22 · St. Louis 1 · Salt Lake City 1

Jeffrey Mfg. Co. Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio

Complete Line of Material Handling, Processing and Mining Equipment



The Tabor-Brasive Universal Cutoff goes to work on a transmission case casting. Table top has been slanted, and spindle frame and wheel tilted nearly 90° from the vertical to bring the 20" dia., 3/16" thick wheel into position for the cut. 60% savings were made on this operation over previous saw and chipping hammer method.

We have abrasive cutoff machines in our blood!

How else could our staff design and build the machine shown—a giant that does almost the impossible.

It cuts gates, fins, and risers at just about any angle, from almost any shape of casting, within a 220-square foot working floor area.

"Flexibility," you ask? The main column moves back and forth. The arm swings completely around the column. The spindle frame swings 270° around the end of the arm and rotates 90° either way from vertical. The cutting table handles castings weighing up to 500 pounds. Table unit raises and lowers hydraulically and rotates 360° on its vertical axis. Table top also rotates about its center and tilts 90°. As many as four tables can be incorporated in the unit. Except for the chopping or cutting action, all movements are electrically controlled and spring-locked.

Such an example of design skill serves to reaffirm that Tabor is a good place to go for abrasive cutoff machines. Our standard line covers foundry and metalworking units—from 3 H.P. on up. Complete bulletins and data for the asking.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

THEY'RE CUT OUT...TO CUTOFF!

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

FOR

greater speed

IN

sand mixing

the CLEARFIELD MIXER

The Clearfield Mixer offers you increased speed and thoroughness in sand tempering because of its unique revolving pan and vertically rotating muller principle of operation. Because the mullers are stationary in the horizontal plane they exert a twisting, sliding movement on the sand which rubs or smears the bond on the grains of sand. This action substantially reduces the tempering period and results in sand that is thoroughly and uniformly bonded.

Clearfield Mixers are available in capacities to meet any sand preparation need. Write today for Catalog No. 79 for details.

CLEARFIELD
MIXER

MIXES, TEMPERS
AERATES

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A

KEOKUK ELECTRO-SILVERY

Yes, here's *your* unbeatable trio . . . Keokuk 60 lb. pigs for blocking the open hearth heat . . . 30 lb. pigs and 12½ lb. piglets for charging the cupola. "Pig for pig . . . car for car," the quality and uniformity of Keokuk Electro-Silvery *never* varies!

KEOKUK ELECTRO-METALS COMPANY

Keokuk, Iowa • Wenatchee Division: Wenatchee, Washington

SALES AGENTS

Miller and Company

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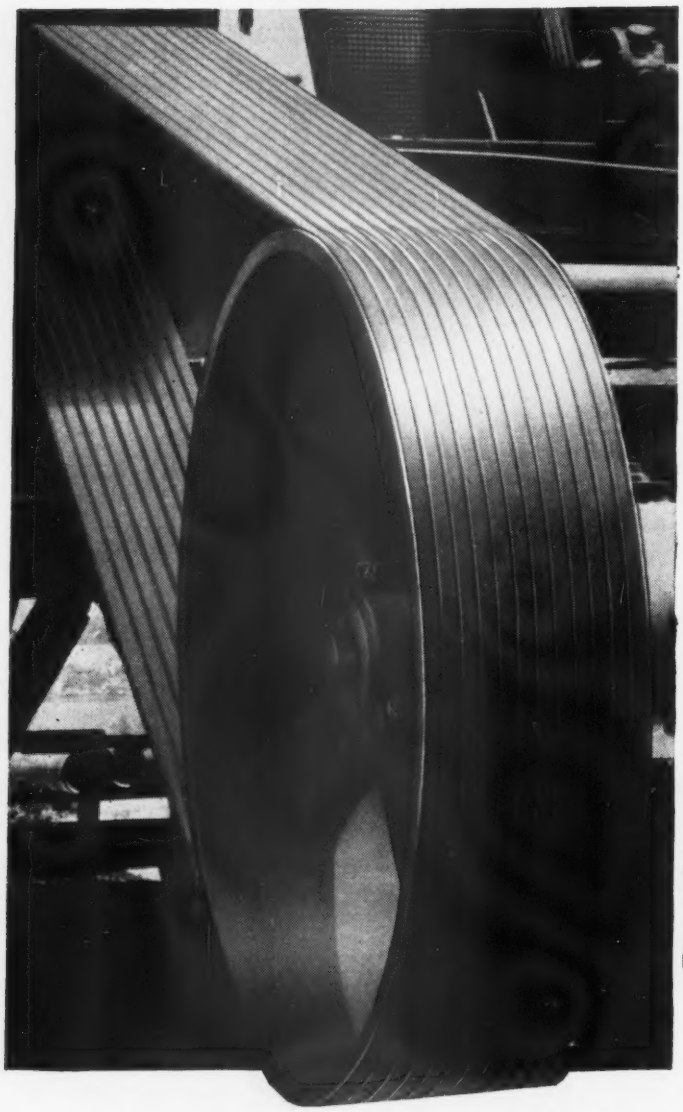
- 3504 Carew Tower, Cincinnati 2, Ohio
- 407 N. Eighth St., St. Louis 1, Missouri



How to get Teamwork out of V-Belts

1 Match them for length*

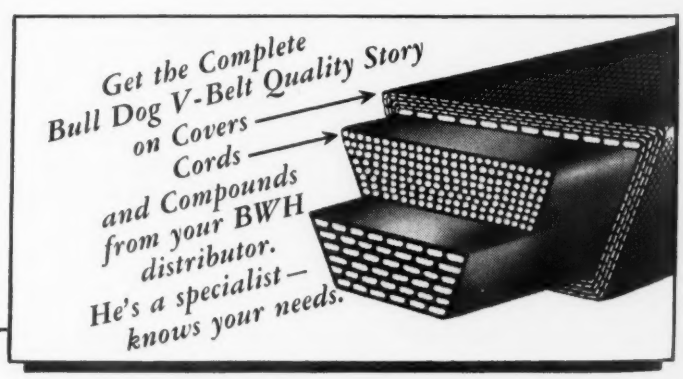
2 Match them in make*

3 Check sheaves for alignment and groove wear

4 Install Sets of Bull Dog V-Belts for Uniformity of Quality...

**Should* an individual belt fail, it is neither practical nor economical to replace it with a new belt. The new belt may be either shorter or longer than the remaining belts. If shorter, the excessive overload it must carry will cause early failure. If longer, it will not carry its share of the load, thus adding nothing to the life of the drive.

You can't be sure about length or compare hours worked unless you install new V-Belts by the set. You can't be sure of uniformity of quality unless you install Bull Dogs.



BWH
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

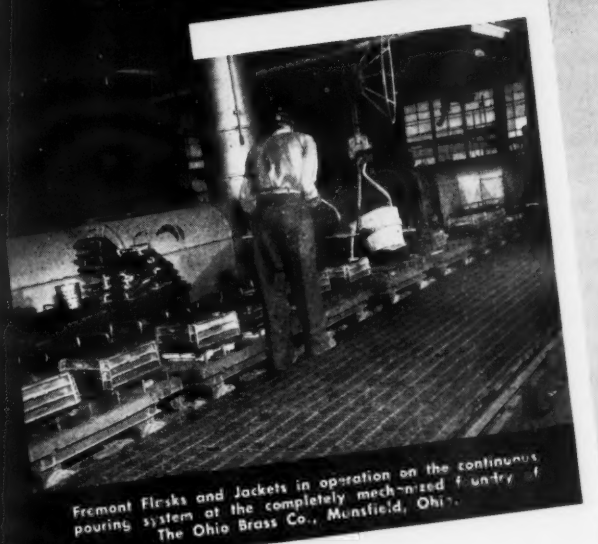
Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

At Bruce Foundry & Mfg. Co., Tecumseh, Michigan, they use only Fremont Flasks and Jackets.

Use Them Once... and you'll never change

Fremont Flasks and Jackets as used at Burt Foundry Co., Toledo, Ohio.



Fremont Flasks and Jackets in operation on the continuous pouring system at the completely mechanized foundry of The Ohio Brass Co., Mansfield, Ohio.

FREMONT MAGNESIUM SLIP FLASKS

EASIER TO HANDLE

(Magnesium weighs 1/3 less than aluminum).

LONGER SERVICE

(Magnesium has twice the tensile strength of aluminum). Solid, bolted and welded corner construction.

MORE EXACTING WORK

Accurately machined inside surfaces and flanges. Steel faced top and bottom flanges. The one-inch GROOV-LOCK FOOLPROOF PIN, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available).

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

MORE ECONOMICAL

Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries.

Flasks and jackets can be assembled on 3°, 4° or 5° taper. Write today for literature.

The Fremont FLASK CO.

FREMONT, OHIO

Floatex® Does It for Farrel-Birmingham

That jumbo casting is a pump casing of GA Meehanite® metal weighing over four tons. It is about to shed its cement "overcoat" in the Ansonia, Conn., plant of Farrel-Birmingham Company, Inc.

It's unique for two reasons—it was cast with cement-bonded sand . . . and that sand will be removed in ten minutes!

A Hewitt-Robins Floatex Shakeout does the trick. With an air gun, it used to take up to 15 hours!

Flasks like this are routine for the Floatex Shakeout, and there's good reason why . . . it's *designed* right and it's *built* right. Floatex is big, it's fast, yet it's gentle. It does the job by shaking the *flask*—not the foundry.

The live frame is supported by soft, heavy duty coil springs. Vibration can't escape to weaken building structures, collapse unpoured molds or jangle workers' nerves. And every inch of the Floatex deck vibrates . . . *every inch is alive.*

What's more, Floatex can do not *one* but *two* basic foundry jobs . . . flask shakeout and core knockout . . . in a single operation without removing the casting! That means only *one* investment, and twice the work from the same machine.

Hewitt-Robins Floatex Shakeouts are made in portable, stationary and self-discharging types—in sizes to handle flasks weighing a few ounces up to 100 tons and more.

Write today for Bulletin 124B. It tells the whole story. Robins Conveyors Division, 270 Passaic Avenue, Passaic, N. J.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

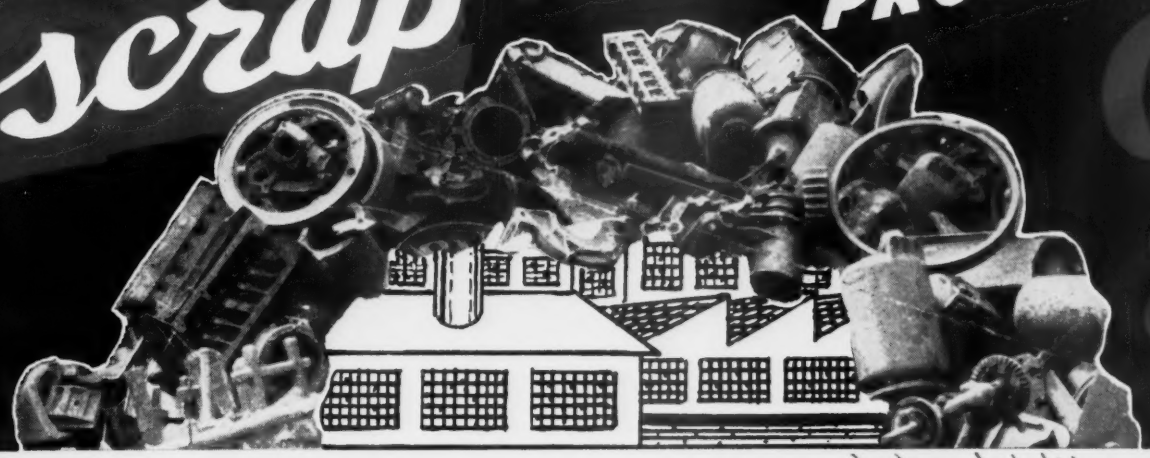
HEWITT-ROBINS

FLOATEX SHAKEOUT

HEWITT-ROBINS HR **INCORPORATED**

BELT CONVEYORS *(belting and machinery)* • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

How much is casting scrap HOLDING DOWN PRODUCTION



A large percentage can be avoided by using

It is common knowledge that casting rejects interfere with production schedules and deliveries—and add to labor cost.

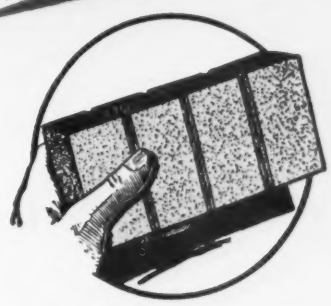
Leading foundries from coast to coast and Canada have licked the defective casting bugaboo—their make-overs have been comparatively nil due to greatly improved castings made possible by using Famous Cornell Cupola flux to *purge molten iron of impurities and increase its fluidity.*

Famous Cornell Cupola Flux also desulphurizes molten iron and keeps the slag fluid.

• • •

GREATLY REDUCES CUPOLA DOWN TIME AND MAINTENANCE, TOO. Cupolas are kept cleaner. Bridging over is practically eliminated. Drops are cleaner. And a glazed or vitrified surface which is formed on brick or stone reduces erosion of cupola lining.

WRITE FOR BULLETIN NO. 46-B



Famous CORNELL CUPOLA FLUX

(Approx. 4 pound brick)

• ADVANTAGES OF SCORED BRICK FORM:

No digging out of container. No weighing. No measuring. No waste. You simply lift Famous Cornell Cupola Flux from container and toss it into cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges, as per instructions.

A boon to both gray iron foundries and malleable foundries with cupolas.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES

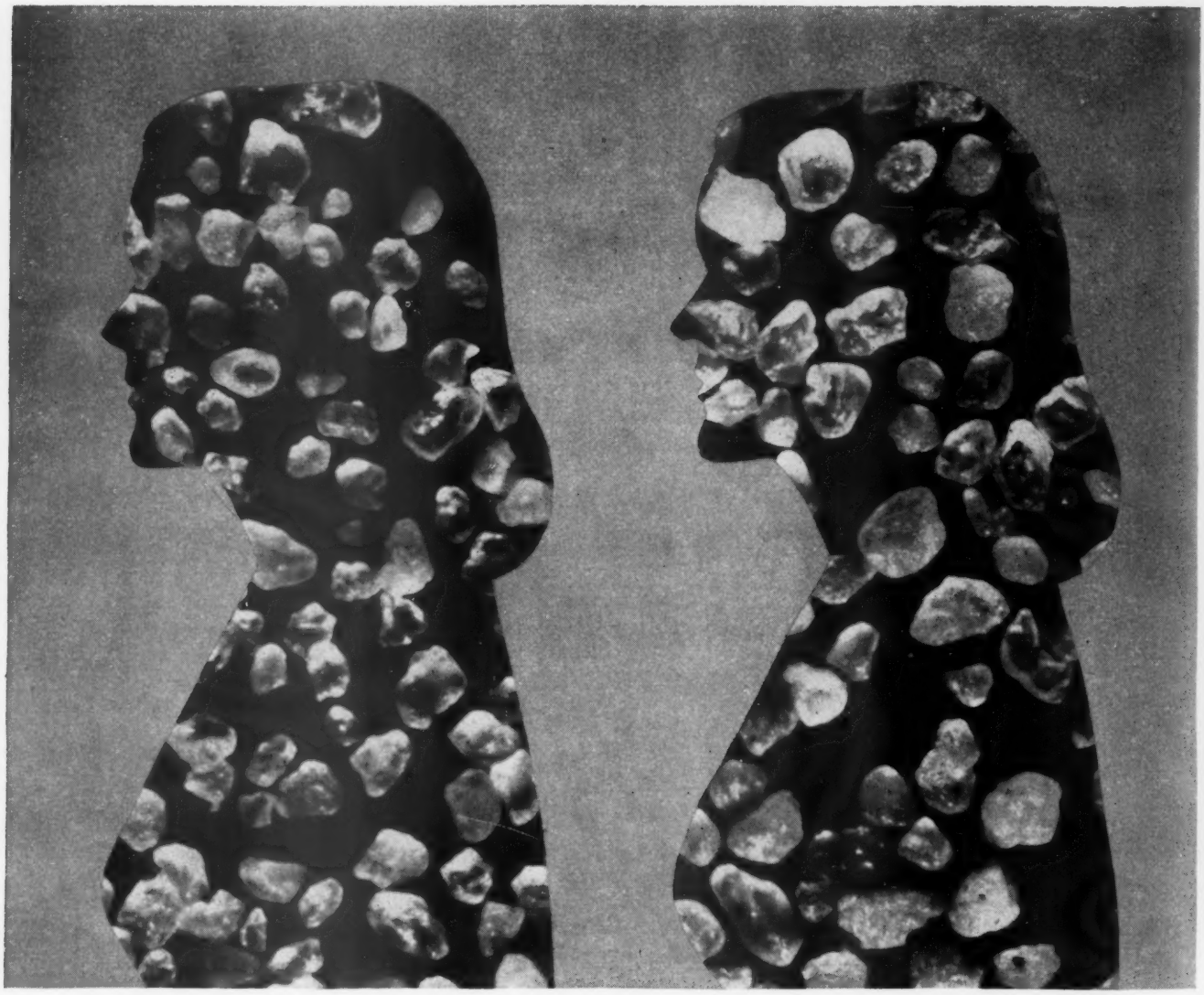
Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass eve when the dirtiest brass turnings or sweepings are used. Yo pour clean, strong castings which withstand high pressur tests and take a beautiful finish. The use of this flux save considerable tin and other metals, and keeps crucible and fu nace linings cleaner, adds to lining life and reduces maintenance

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminu so that you pour clean, tough castings. No spongy or porou spots even when more scrap is used. Thinner yet stronger sec tions can be poured. Castings take a higher polish. Exclusiv formula reduces obnoxious gases, improves working condition Dross contains no metal after this flux is used.



Which twin saves the money?

The one on the right, of course! You're looking at photomicrographs, enlarged 30 times, of new sand (left), and of reclaimed sand (right). Not much difference, is there? They look alike, they act alike, they are alike. Yet, waste sand processed by a Nichols Sand Reclamation System in most cases costs only one quarter as much as new sand.

Nichols Engineering & Research Corp.
70 Pine St., New York 5, N. Y.
1920 N. Meridian St., Indianapolis 2, Ind.
40 S. Los Robles Ave., Pasadena 1, Calif.
1477 Sherbrooke St., W., Montreal 25, Canada

Nichols

Sand Reclamation Systems

THREE GREAT "MAG" FURNACES

FOR FOUNDRIES, DIE CASTING and PERMANENT MOLD PLANTS

1. Furnace with hood open.

2. Furnace with hood open for dipping.

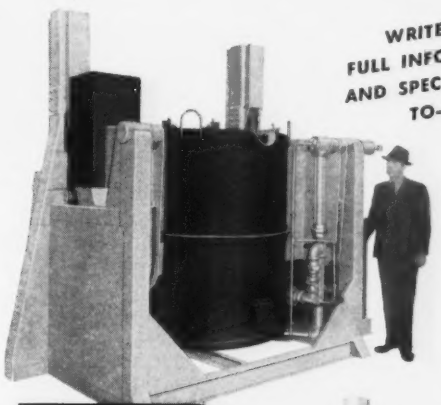
3. Furnace with opening and trough for hot charging.

NEW!

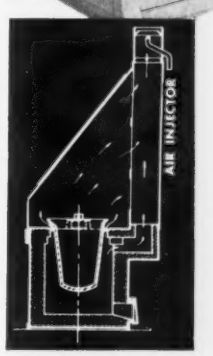
STROMAN TYPE SFE MAGNESIUM MELTING AND HOLDING FURNACES

These furnaces were designed to meet the demands of the industry for faster, more efficient and most economical magnesium melting. Their engineering incorporates many exclusive features. They come complete with sulfur dome and hood. Provisions for hot charging through hood and dome are included. They are excellent furnaces for permanent mold, die casting and sand casting operations. The hoods provide ample venting for the gases of combustion, sulfur and fluxing fumes. They come complete with blowers and choice of oil or gas fire. Automatic controls are also available if desired. Capacities: 250- 350- 600- 800- 1200- 1600-pounds.

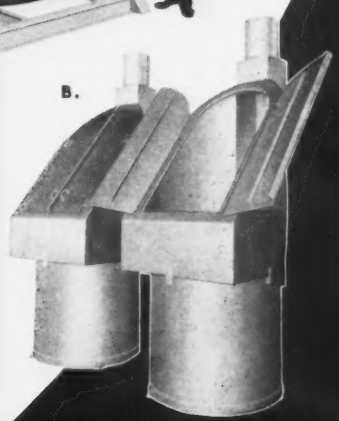
WRITE FOR FULL INFORMATION AND SPECIFICATIONS TO-DAY!



A.



B.



STROMAN MAGNESIUM AND ALUMINUM MELTING AND HOLDING FURNACES

A. Hydraulic Tilt Magnesium and Aluminum melting furnace handling from 500 to 3000 lbs. of aluminum. Incorporates the famous Stroman Stationary Lip Pour, which creates a constant pouring arc at any desired pouring speed. Saves time and metal. These furnaces may be so arranged in series so that several may be operated from one hydraulic pump unit.

B. Stationary Super-Heating or Melting Furnaces, Type S. F. Designed to deliver the correct super-heat to magnesium after it has been melted in larger furnaces, and before it is poured into the molds. Can also be used for breakdown or holding. They have all safety features. Are available for cast steel pots or fabricated steel pots. Furnaces may be equipped with hoods if so desired, for the venting of combustion and other gasses. Write for bulletin No. 100.

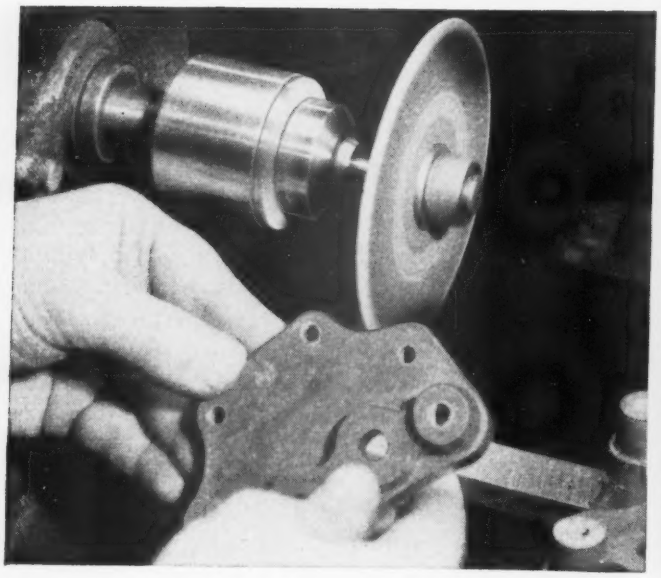
LET STROMAN SOLVE YOUR NON-FERROUS METAL MELTING PROBLEMS • WRITE TO-DAY!

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

SUPERLATIVE FOR

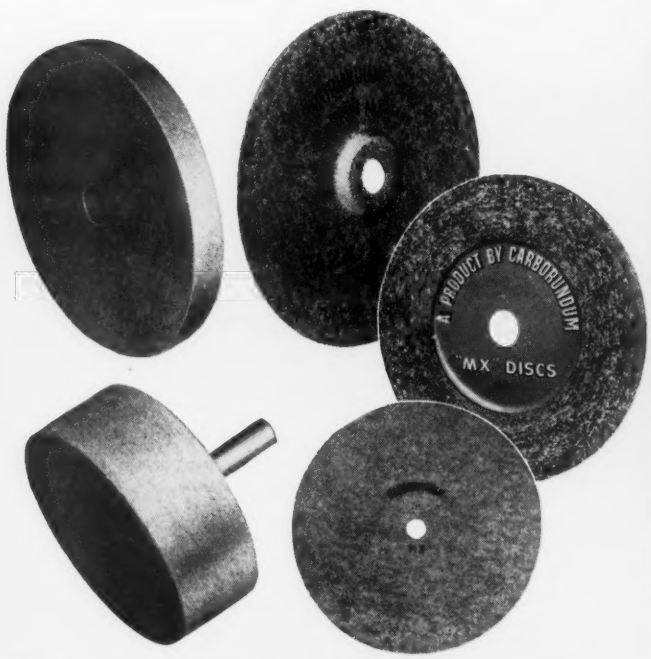


STRAIGHT WHEELS
... for removing flash from non-ferrous castings.

MOUNTED WHEELS
... for removing tool marks and scratches from finished surfaces.

MX

the versatile, long life, self-cleaning, high strength, cushion-action abrasive



by CARBO

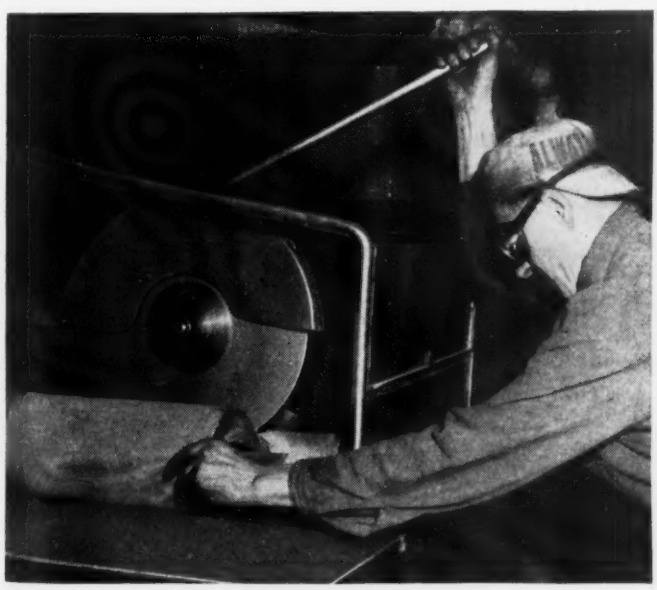
TRADE

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

CLEANING UP CASTINGS

DEPRESSED CENTER WHEELS
...for removing mold marks from non-ferrous castings.

DISCS
...for removing flash from cast iron housings. Also for removing fins between molded sections of castings.



PRODUCTION CUT-OFF WHEELS
...for cutting gates and risers from all types of non-ferrous castings.

MX—one great product in 5 distinct forms—each one a superior cost-cutter for foundrymen everywhere!

The reason lies in the MX bond, tough yet resilient—it provides a fast-cutting action that's extremely soft and clean, yet rugged enough to perform many heavy-duty operations.

Get the MX story from your CARBORUNDUM or distributor salesman —or write Dept. F 81-60

RUNDUM

MARK

offering ALLabrasive products...to give you the proper ONE

81-60

OUTSTANDING RESULTS WITH

TAM*

ZIRCONITE

ALL-PURPOSE PASTE WASH

● An outstanding advantage of TAM Zirconite paste wash is that any washing solution made from it can be used ***immediately after preparation.*** As a wash, it mixes readily and easily with water.

● Because of its high fusion point and other characteristics, Zirconite paste wash has proved to be an excellent material in both ferrous and non-ferrous usage where it assures a smooth casting surface.

● Multiple bonding agents provide increased resistance to settling ...enable wash to remain on core or mold without peeling, checking or spalling throughout baking or pouring operations.

Our field engineers will be glad to demonstrate the advantages of Zirconite paste wash or you may obtain complete information by writing our New York office. No obligation, of course.

TAM PRODUCTS

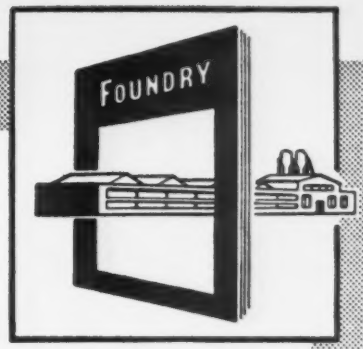
Registered U. S. Pat. Off.

*TAM is a registered trademark.

TITANIUM ALLOY MFG. DIVISION

NATIONAL LEAD COMPANY

Executive and Sales Office: 111 BROADWAY, NEW YORK CITY · General Offices, Works, and Research Laboratories: NIAGARA FALLS, N.Y.



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Write the name of the advertiser and the page number of the ad in the spaces provided. Check the type of information you want. After you have finished going through this issue of FOUNDRY and have jotted down all of the ads on which you'd like more information, just tear out the card, drop it in the mail. We'll do the rest.

Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
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FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

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No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio
Readers Service Dept.

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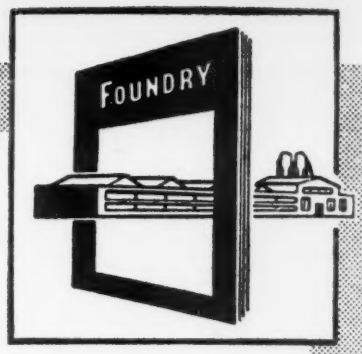
YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 3-52



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YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

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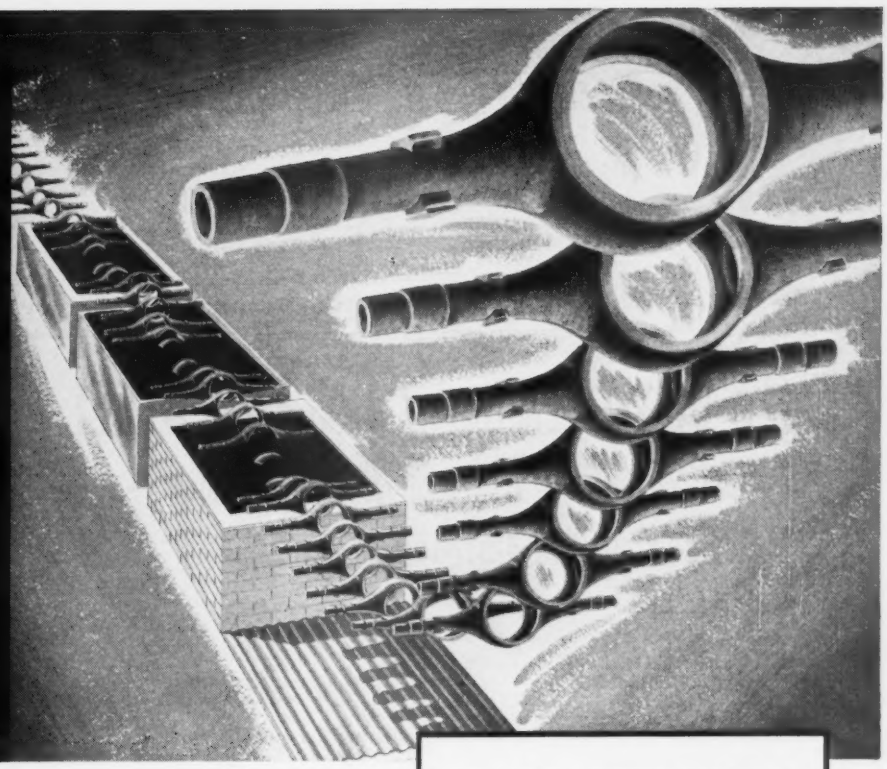
FOUNDRY
Readers Service

New! VIRGO® MOLTEN CLEANER



DESANDS • DEGRAPHITIZES • CLEANS METAL

20 times faster

THAN BY USUAL METHODS

VIRGO MOLTEN CLEANER is the new, fast, simple way to desand and degraphitize iron and steel castings. It works in *10 minutes or less*—gives you chemically clean castings, with full dimensional stability, in a fraction of the time required by conventional methods.

PROVED IN USE—Large automotive and equipment manufacturers use Virgo Molten Cleaner for desanding and degraphitizing transmissions and bearing shells . . . save hundreds of hours a month with this new Hooker Process.

The Process is non-electrolytic; non-toxic. It employs simple equipment; does not require close supervision; is easily adapted to your production methods. For full details, mail the coupon or write us today.

What VIRGO MOLTEN CLEANER is:

A green flake salt developed specifically for companies producing and working with castings, forgings, fabricated parts.

What VIRGO MOLTEN CLEANER does:

- Desands and degraphitizes castings
- Stress relieves
- Quickly removes: enamel, rust, paint, grease, chemicals, dirt, rubber

For Fast, Safe, Low-cost DESCALING —VIRGO® DESCALING SALT

Producers and fabricators of stainless and alloy steels use Virgo Descaling Salt to quickly remove scale produced by hot rolling, forging, extruding, casting, annealing.

Hooker helps you with 15 years' experience in molten salt bath descaling and cleaning. Complete engineering, research, sales and on-site operating assistance are part of our service.

SEND FOR THESE BULLETINS

Get the whole story on Virgo Molten Cleaner and Virgo Descaling Salt—what they are, how they work, their advantages, equipment involved, and Hooker services you enjoy as a user. Send for these bulletins today.

HOOKER CHEMICALS®

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y.
WILMINGTON, CALIF.
TACOMA, WASH.

1-1466

Hooker Electrochemical Company

20 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

Please send me Bulletins on Virgo Descaling Salt and Virgo Molten Cleaner.

NAME_____

TITLE_____

ADDRESS_____

COMPANY_____

CITY_____ ZONE____ STATE____

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Extra-Low-Carbon STAINLESS STEEL

New Type Chromium-Nickel Steels Have Added Corrosion Resistance

New and improved austenitic stainless steels of the 18-8 type have been developed which have superior corrosion resistance after being exposed to heat. These steels, known as extra-low-carbon stainless steels, were designed especially for use in welded and stress-relieved equipment that is exposed to more severe corrosive conditions than are normally encountered by other types of straight 18-8 stainless steel.

Under severe corrosive conditions, intergranular attack may occur in some of the higher carbon grades of austenitic stainless steels that have been subjected to the temperature range of 800 to 1600 deg. F. during welding or hot forming operations. It is generally agreed that this type of corrosion is caused by complex carbides that are formed at the grain boundaries of the stainless steel during heating.

The effect of heat is rarely harmful in the ordinary fabrication of stainless steel for most applications, such as in architecture, the food and dairy industries, in hospitals, and in the home. However, in the chemical and other allied industries, where stainless steel is used in the handling of very corrosive chemicals, these new extra-low-carbon stainless steels should most certainly find wide use.

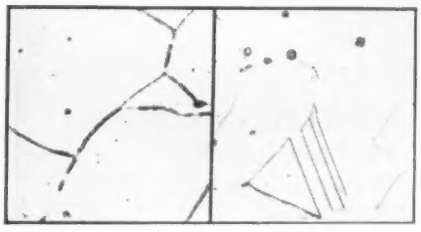


Fig. 1 Left: Carbide precipitation at the grain boundaries of an 18-8 stainless steel, containing 0.059 per cent carbon, after being held at 1200 deg. F. for 1 hour. Right: Absence of carbide precipitation in 18-8 stainless steel of 0.03 maximum carbon content, after being held at 1200 deg. F. for the same length of time.

In general, there are three ways in which the precipitation of carbides can be controlled in stainless steel:

1. Heat-treating so that the carbides present are dissolved.
2. Alloying with an element, such as columbium, tantalum, or titanium, that will tie up the carbon in the form of a harmless carbide.
3. Decreasing the carbon content of the steel.

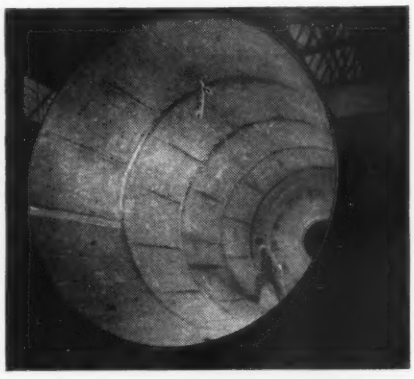


Fig. 2. The new extra-low-carbon stainless steels are especially suited for large types of process equipment, such as this fractionating tower. They require no heat-treatment after welding.

Heat-Treatment After Welding

Before the development of extra-low-carbon stainless steel, or of the "stabilized grades," one means for preventing intergranular corrosion was to heat-treat stainless steel that had been subjected to the dangerous temperature range, so that the precipitated chromium-carbides would go back into solid solution. It was found that when a welded part was heated to temperatures of 1950 to 2000 deg. F., and then cooled rapidly, most of the carbides were retained in solid solution. This extra heat-treatment is sometimes impractical, however, because of the design or massive size of some types of welded equipment.

Decreasing Carbon Content

A recent development in preventing intergranular corrosion has been the extra-low-carbon stainless steels. To be substantially harmless in stainless steel for as-welded or welded and stress relieved chemical equipment operating at temperatures under 700 deg. F., carbon must not be present in quantities over 0.03 per cent.

In 1937, ferrochrome with 0.03 per cent maximum carbon was first produced for the steel industry by ELECTROMET. This product has helped make it possible to produce very-low-carbon stainless steels—steels that are completely immune to intergranular corrosion after welding or after subjection to a stress-relieving heat-treatment.

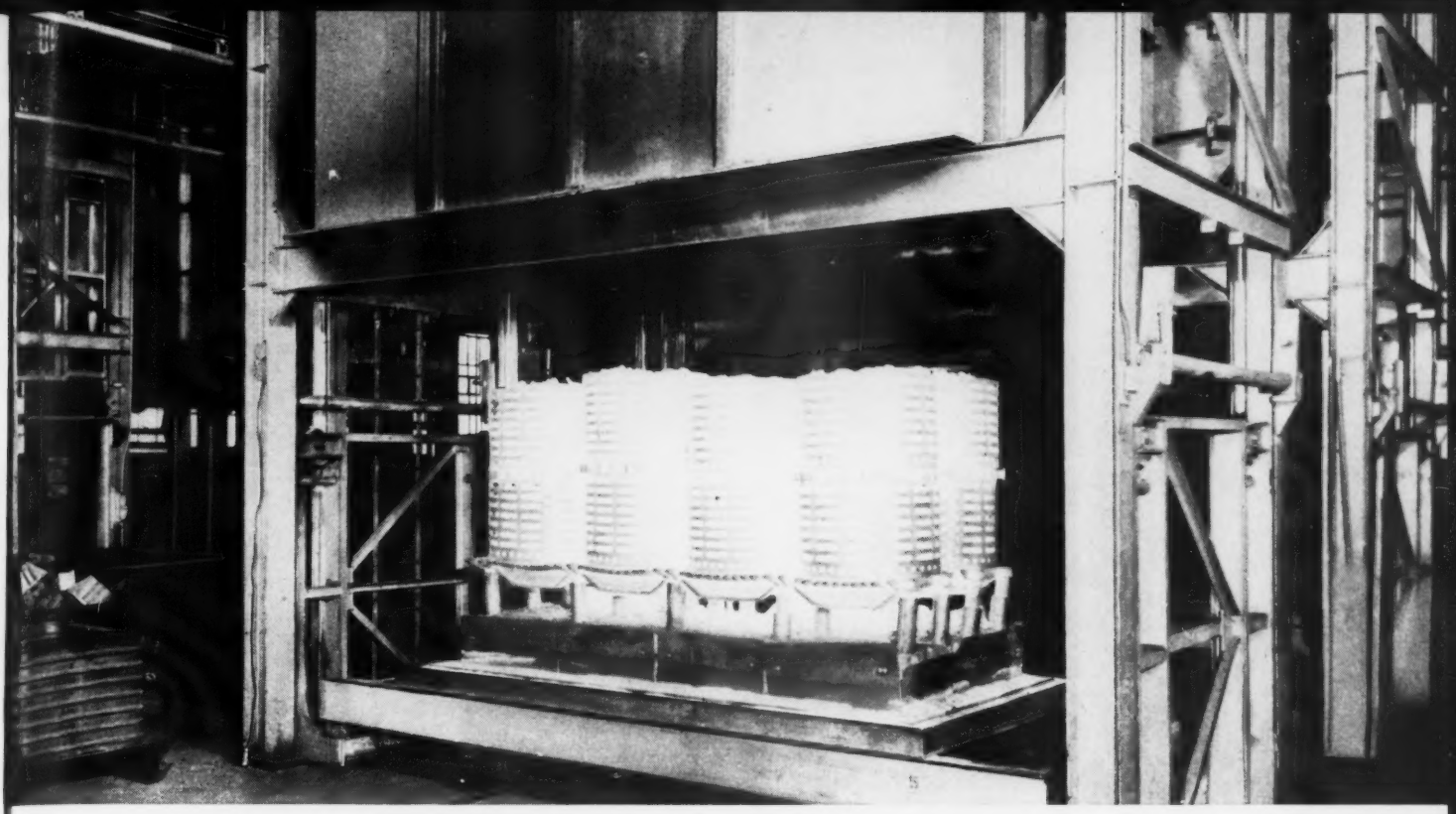
The amount of stabilizing element that is necessary to "fix" carbon in stainless steel is in direct proportion to the carbon content of the steel. Therefore, the lower the carbon the less is the amount of stabilizing element required. Lowering the carbon content is an efficient means of conserving columbium, tantalum, and titanium.

Metallurgical Service Available

If you use welded stainless steel equipment, it will pay you to investigate the advantages of using extra-low-carbon steels. If you produce stainless steel, our metallurgists will be glad to give you technical assistance in the use of ferrochrome of 0.03 per cent maximum carbon. For further information, write to the nearest ELECTROMET office.

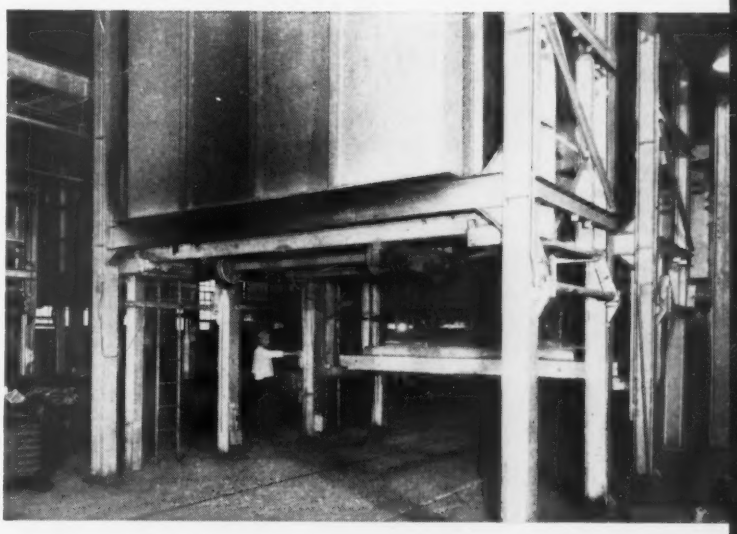
For a more detailed account of the properties of extra-low-carbon stainless steel, write for a free copy of the technical paper, "Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content".

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.



Hot charge being transferred from high-temperature furnace to low-temperature furnace.

Cut Your Over-all Annealing Costs with G-E Furnaces



Uniformly-annealed castings being removed from low-temperature furnace. This installation has four pair of G-E furnaces.

Let the experienced G-E Heating Specialist do a cost study on your malleable plant, as he did for this manufacturer of malleable iron. His recommendations, based on many similar applications, showed this customer that G-E elevator electric furnaces would give the greatest long-range returns for the capital investment.

Give *your* malleable-annealing operation the advantages of electric heat. Here's how G-E furnaces can help you as they helped this manufacturer. Electric heat gives you:

Lower overall annealing costs
Shorter annealing time cycles
More uniformly-annealed castings
A reduction in subsequent operations
Improved working conditions

LEARN MORE about how G-E electric furnaces can speed your production and lower the *overall costs* of processing malleable iron. Call your nearby G-E Sales Office right away. And, to learn more about the furnaces for malleable annealing, clip this coupon and mail it today.

GENERAL ELECTRIC

Sect A 720-52, General Electric Co.
Schenectady 5, N. Y.

Please send me immediately the following publications on furnace equipment.

× for immediate project
√ for reference

☐ GEA-4067, G-E Elevator Electric Furnaces
☐ GEA-4072, G-E Roller-hearth Electric Furnaces

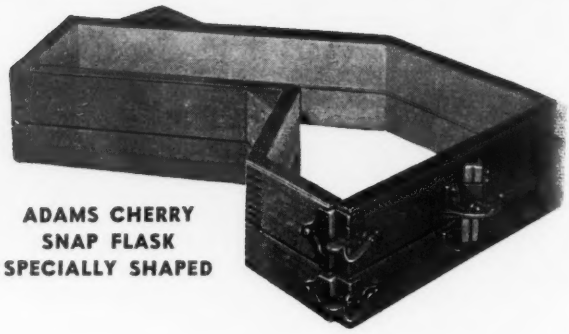
Name.....

Company.....

Address.....

City..... State.....

ADAMS ALUMINUM
SLIP FLASK



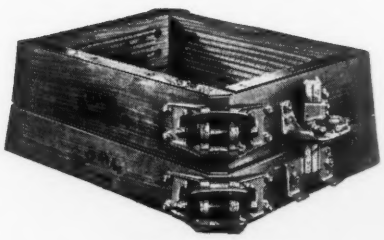
ADAMS CHERRY
SNAP FLASK
SPECIALLY SHAPED

For "All-Out" Production use

ADAMS-BUILT

FLASK EQUIPMENT

Tell us <u>now</u> what you'll need

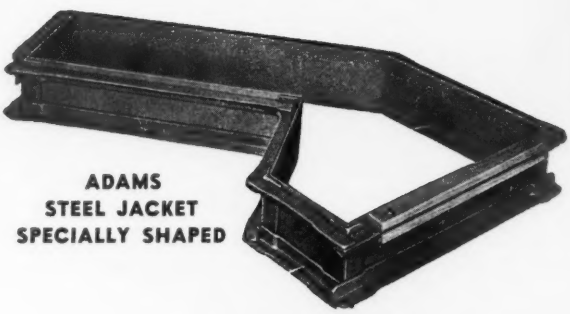


ADAMS CHERRY
EASY-OFF FLASK

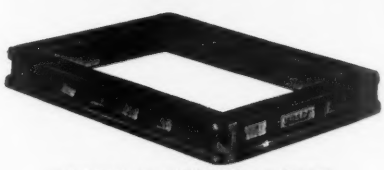
Lest the rising tide of "all-out" production swamp you with unfilled orders . . . we urgently request that you review the needs of your foundry for molding machines, flasks and allied equipment.

If you will then place your order at once, we shall make every effort to deliver your equipment on the date you must have it.

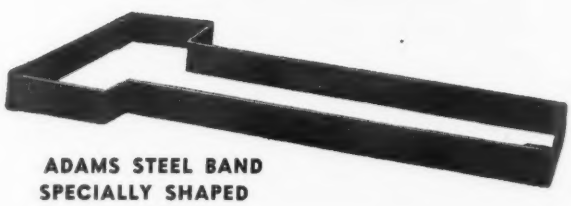
As you know, the battle of the production line is not won with "rejects". *Adams-Built* molding machines and flask equipment will help you to maintain peak production of high-quality castings, reduce rejects and lower production costs. May we hear from you now?



ADAMS
STEEL JACKET
SPECIALLY SHAPED



ADAMS ALUMINUM UPSET



ADAMS STEEL BAND
SPECIALLY SHAPED

THE ADAMS COMPANY
800 Foster St. **Dubuque, Iowa**

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

Why You'll Grind Better with Wheels

JOB-FITTED FOR YOU ALONE

Your Own Code No. and Formula Right on the "SPECS"

You set up a chain of procedure that has *one* objective—better, lower cost grinding—with your first order for Besly-Titan Abrasive Wheels or Discs. *Job-Fitting* starts with your requirements, the nature of your work, the results you want in grinding. Then, carefully balancing such things as wheel size and speed, blend of abrasive sizes and types, porosity and many other factors, a formula is established and given a code number. It identifies a wheel for you—to match your grinding needs *exactly*.

The value of Besly-Titan *job-fitting* is shown by the record. Foundries now using Besly-Titan Wheels are getting faster grinding with a lower total cost. It is only reasonable that *you* will get similar results.

Besly-Titan Wheels cost you no more than "stock" wheels. Once "specs" have been established, delivery in just a few days is routine. You re-order by code number—certain that every wheel will be *exactly* the same—*job-fitted* to your needs.

BESLY-TITAN

ABRASIVE WHEELS AND DISCS

Are "Job Fitted" for the Foundry

BESLY TITAN

CHECK UP ON THE COST-CUTTING, QUALITY-BOOSTING POSSIBILITIES OF BESLY-TITAN JOB-FITTED WHEELS. WRITE FOR FULL INFORMATION.

BESLY-WELLES CORPORATION

Established as CHARLES H. BESLY and COMPANY in 1875

20 N. Wacker Drive Chicago 6, Illinois

Representatives in Principal Cities

Here's the Answer...

FIRST IN SILICONES
DOW CORNING 7 EMULSION
SILICONE RELEASE AGENT FOR RESIN BONDED SAND SHELL MOLDS
NET WT. • LOT NO.
DOW CORNING CORPORATION, MIDLAND, MICHIGAN USA

for easy release of shell molds, use DOW CORNING 7 EMULSION!

This NEW Silicone Release Agent:

- gives easy release of clean, sharply defined resin-bonded sand shell molds:
- reduces build-up on patterns; cuts pattern cleaning costs; maintains close tolerances.
- It's noncorrosive and nonflammable.
- Easily applied by spraying or dipping, this water dilutable emulsion of Dow Corning 7 Compound is equally effective with various metals; one application will release several shells.

Send Today For Free Sample

WRITE DEPT. AH-15

DOW CORNING CORPORATION

MIDLAND, MICHIGAN

FIRST IN SILICONES

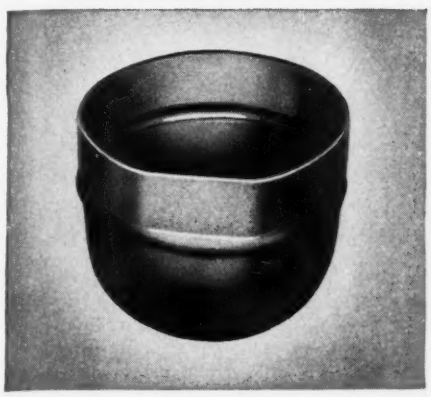
DOW CORNING CORPORATION

MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS • LOS ANGELES • NEW YORK • WASHINGTON, D. C.

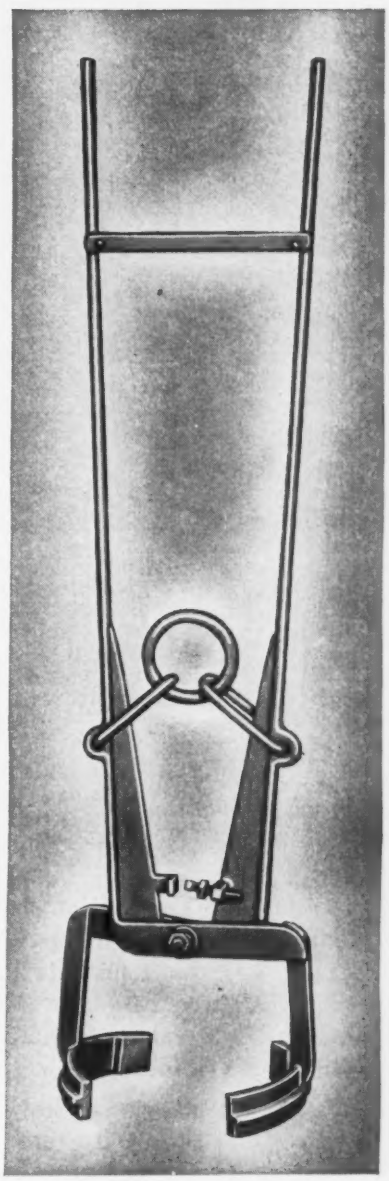
NO. 1 SOURCE FOR

Bowls · Shanks · Tongs

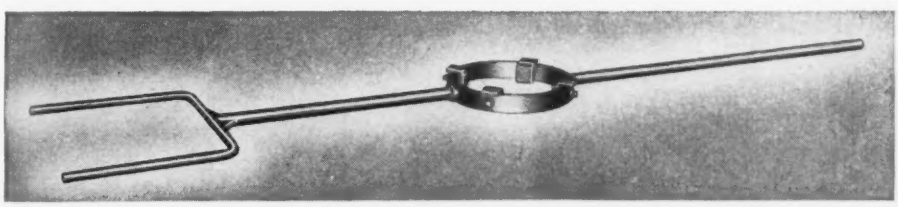


Industrial Equipment round bottom pressed steel ladle bowl, 50 lb. capacity, type 7 flat side.

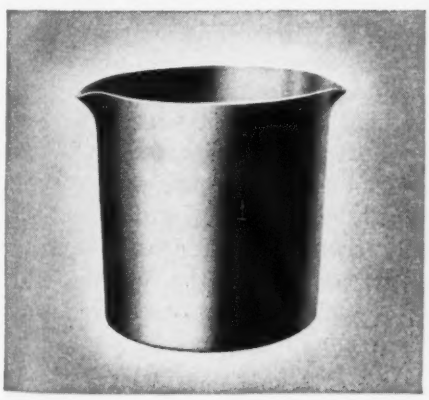
Industrial Equipment round bottom pressed steel ladle bowl, 60 lb. capacity, type 14 circular.



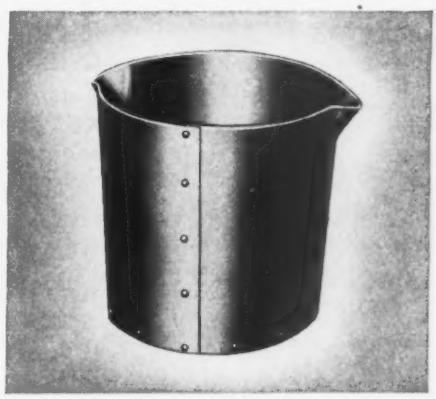
Type 72C crucible tongs. Adjustable. Four-point suspension. Claw types also available.



Industrial Equipment type 30CA single and adjustable ladle and crucible shank. Four-point suspension . . . easily adjustable . . . no springs . . . air cooled band. Fixed band types also available.



Industrial Equipment type 514 flat bottom welded steel ladle bowl. Available in almost any size or thickness.



Industrial Equipment 537 flat bottom riveted steel ladle bowl.

The above Industrial Equipment products, along with dozens of other types of bowls, shanks, tongs and ladles, are included in our latest catalog. *Write for your copy.*

LADLES

SHANKS

BOWLS

TONGS

Industrial

EQUIPMENT COMPANY

115 NORTH OHIO ST., MINSTER, OHIO

YOU'LL DO A BETTER JOB

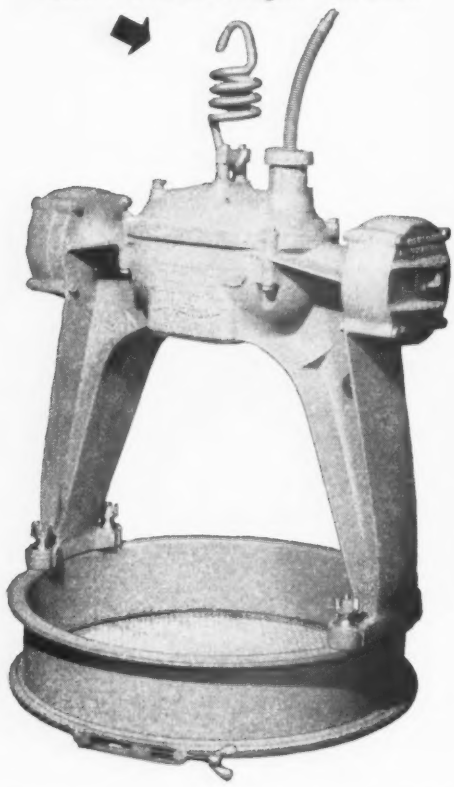
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

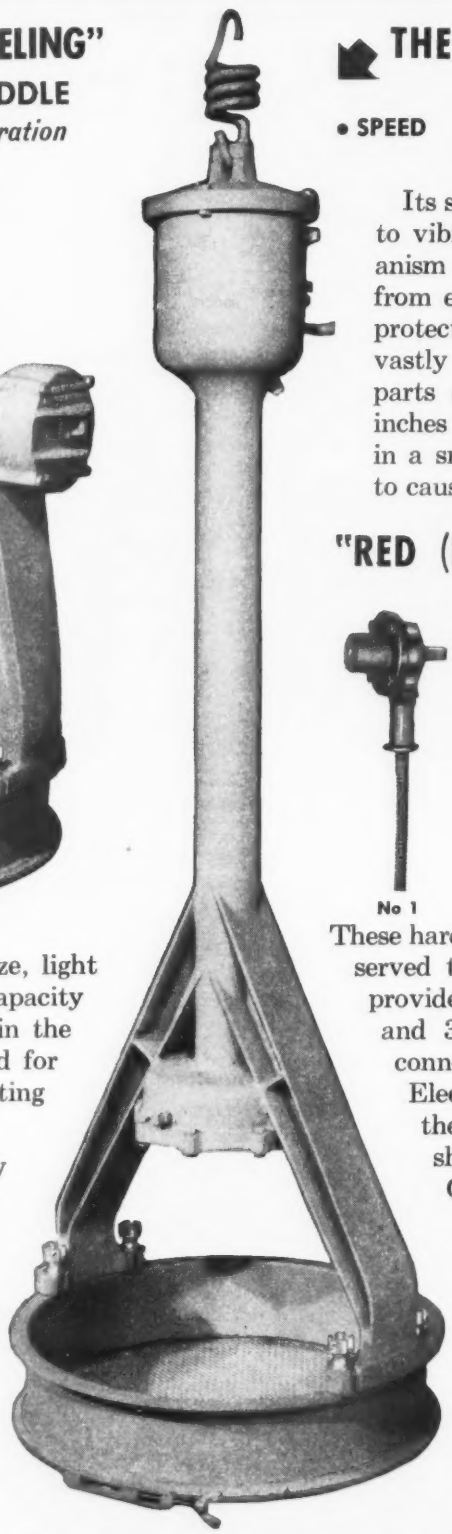


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



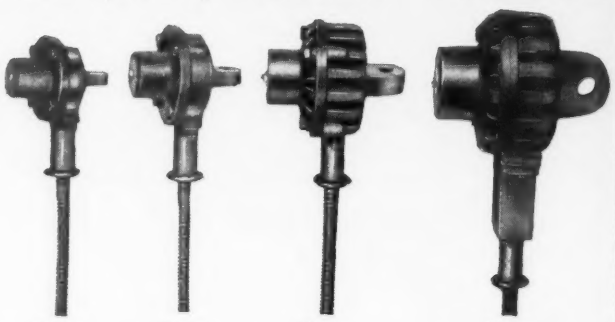
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

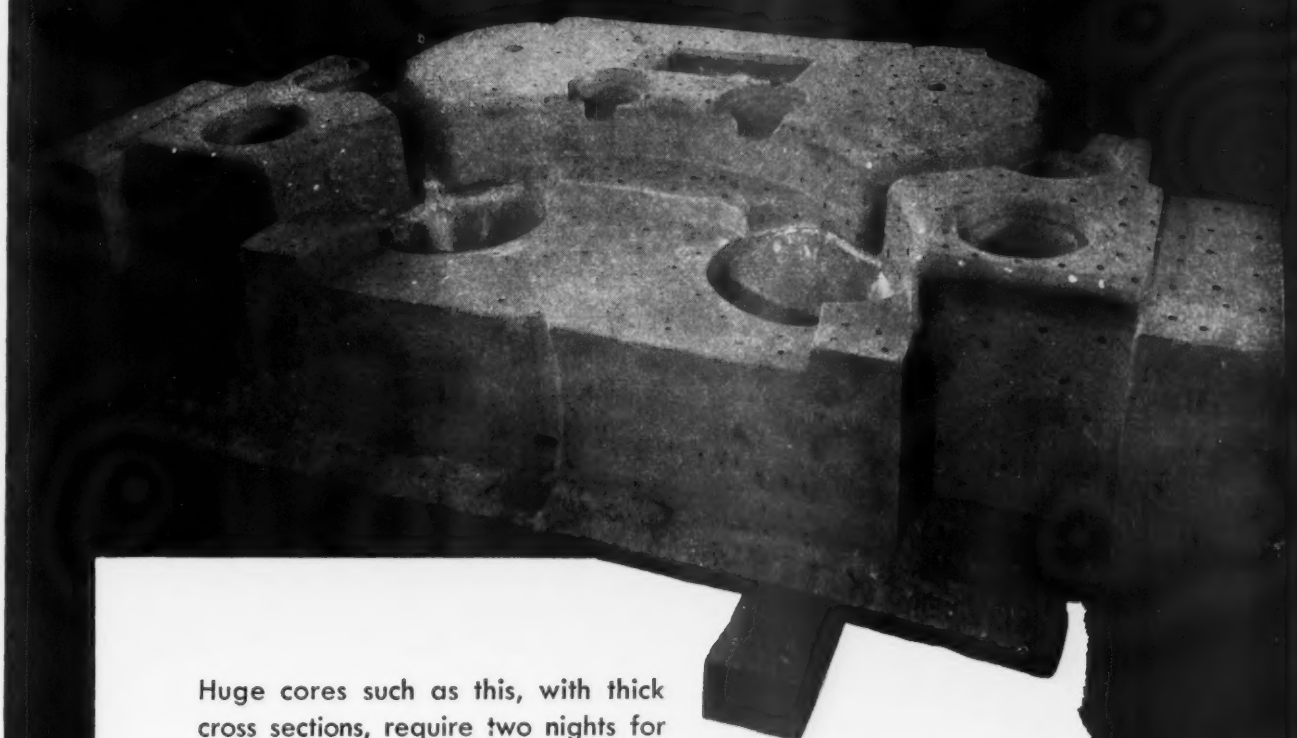
FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Core Baking Time Halved

WITH TRULINE BINDER IN THE MIX



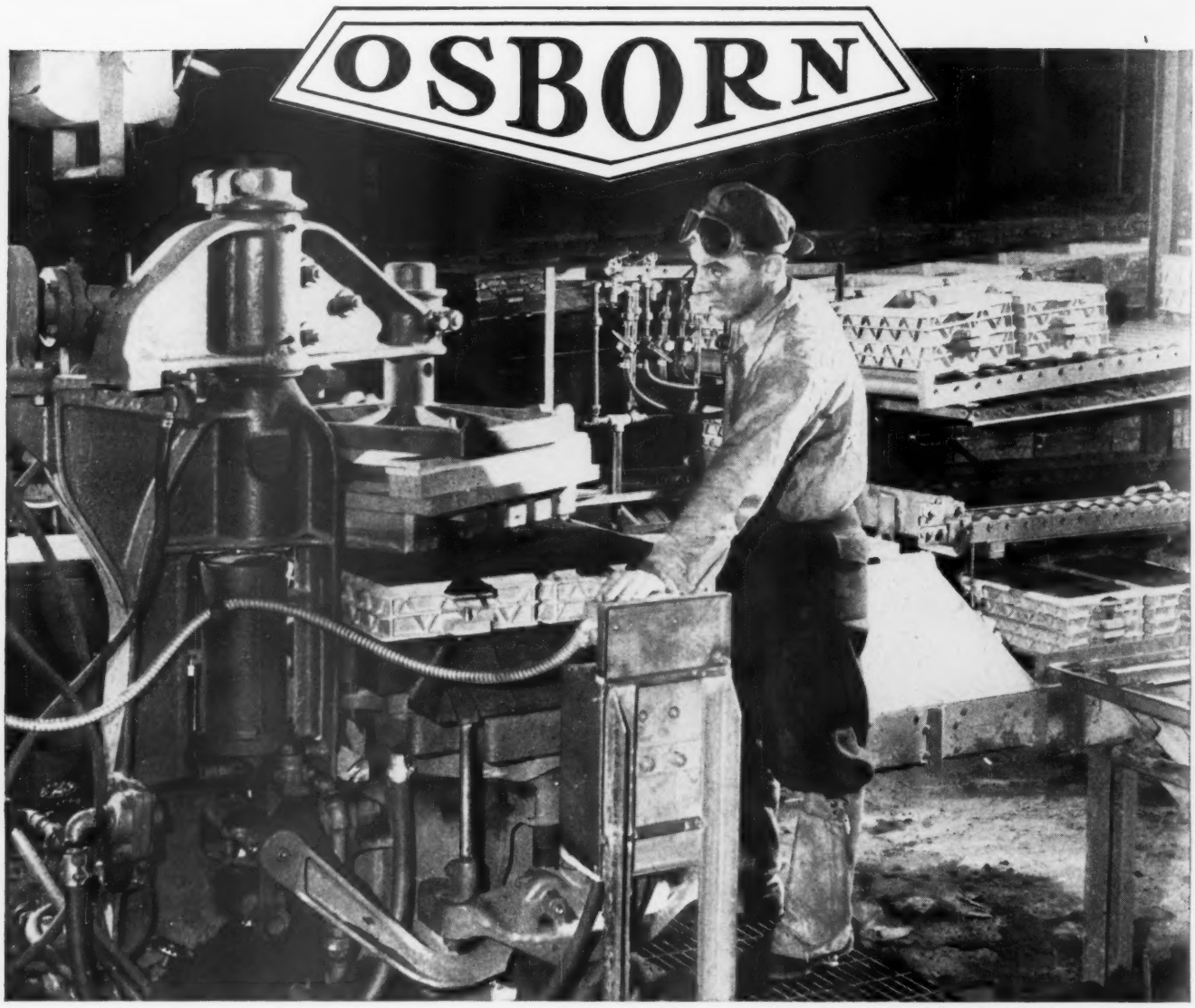
Huge cores such as this, with thick cross sections, require two nights for baking when core oil is used in the mix. Even then, bottoms are sometimes green. By replacing oil with Truline Binder, cores bake faster and uniformly. The one shown here was thoroughly baked overnight!

Truline-bonded cores do a better and faster job all the way. They bake faster . . . increase productive capacity of ovens. They mean less gas at pouring time, thus sounder castings. They collapse easily, and shake out fast. Truline saves up to 50% in cleaning time, and castings come out cleaner . . . require less finishing.

If you are trying to meet accelerated production demands, especially with existing equipment and manpower, it will pay you to send for technical data on Truline Binder. Our foundry service men will be happy to work with you.

NF52-1

HERCULES POWDER COMPANY INCORPORATED Naval Stores Dept., 920 King St., Wilmington, Del.



Osborn's automatic machines ... cut foundry costs!

MORE OUTPUT . . . over 80% increase in operating efficiency. Less operator fatigue. Uniform quality production, hour after hour. These and other cost-saving benefits are reported by foundries using Osborn automatically controlled, molding machines and core blowers.

In the operation above, the workman simply loads the machine and presses a button. The machine does the rest . . . does it automatically. While the machine goes through its pre-set time cycle, the operator is free to set cores, to inspect completed molds or do other essential work in the production of molds. And there is less scrap due to molding. Less operator training is needed for automatically controlled machines.

Automatic controls are available on many different types of Osborn molding machines and core blowers. A factory-trained foundry specialist near you will gladly show how you can benefit. Call or write *The Osborn Manufacturing Company, Dept. 668, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

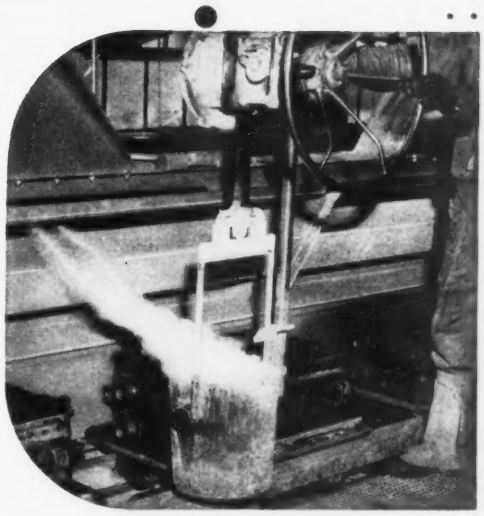
Osborn Molding Machines

A COMPLETE LINE OF FOUNDRY MOLDING MACHINES . . . CORE BLOWING MACHINES . . . INDUSTRIAL BRUSHES

"Moving floor" pouring station. Forty-foot long KIRK & BLUM hood removes fumes *as they are formed* at any point on the moving station.

Fumes DON'T SLOW FAST-MOVING PRODUCTION

. . . AT THE WILLIAM POWELL CO.



Close-up of pouring station. Fumes travel but a few inches to the "lateral cross draft hood"; are exhausted *below* operators' breathing level.

Illustrating KIRK & BLUM'S complete service... design, fabrication and installation...are six dust and fume control systems at The William Powell Company, noted valve manufacturers. From sand handling to casting grinding, these KIRK & BLUM systems provide the clean air so essential to efficient operations.

Whether your foundry melts a few tons or many tons per day, you can use "The Invisible Tool... Clean Air." Let KIRK & BLUM Engineers survey your operations. For further details, write for illustrated literature; address The Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

For further details write for illustrated literature →

KIRK AND BLUM

Still Most Economical — Crucible Melting

Scene in one of the foundries of General Bronze Corporation. Crucibles, it is noted, as stored utilize furnace heat.

When the Foundry schedule calls for 100% production, will your melting equipment take care of it? What about capital charges on melting equipment when operating at 50% or lower?

Crucible melting is best suited to meet these fluctuations. The adaptability and flexibility of the crucible-equipped foundry allows for the ups and downs of a production schedule.

For the "ups" crucible melting is particularly appreciated; for the "downs" it is a most practical method of economy.

The foundry equipped with crucible furnaces, is ready for "come what may" in business.

There is practical information for foundrymen in the new fourth edition of Crucible Melters' Handbook; mailed free.

CRUCIBLE MANUFACTURERS ASSOCIATION

27 WILLIAMS ST., NEW YORK 5, NEW YORK

Readers' COMMENT

Journey to U.S. Profitable

TO THE EDITORS:

Having returned safely, please permit me to hasten to thank you gratefully for the great courtesy shown to me at the time of my call at your office.

Frankly, my journey to the United States, especially at your place, was much more pleasant and profitable to me than I had expected. I feel certain, moreover, that what I learned in your country will contribute to no small extent to the rehabilitation of Japanese industry. I am grateful more than I can express for the generosity and good will of your people.

Lastly, I sincerely hope that the international relations and the industrial co-operation between our two countries will become more intimate as the days go by.

FUKUJI OKUMURA
President
Nippon Steel Foundry Co. Ltd.
383 Chishima-cho Taisho-ku
Osaka, Japan

* * *

How To Correct Chilled Edges

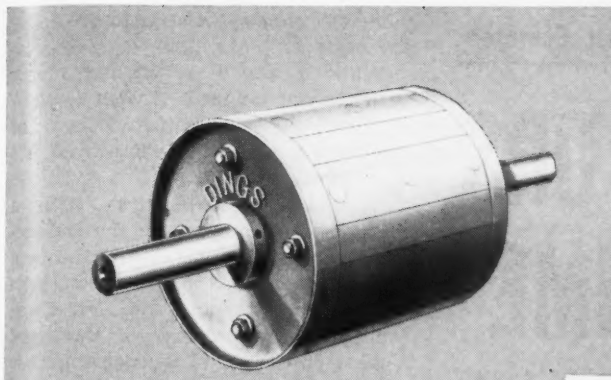
TO THE EDITORS:

The December, 1951 issue of FOUNDRY carried a "Question and Answer" headed "Castings Show Chilled Edges," which contained the statement, "Some of these rings will have a chilled edge and cannot be machined." I believe the trouble results from too much moisture in the sand and would suggest that it be kept as dry as possible. Also care must be taken in wetting around the edges with a swab.

It would be very easy to determine if this is the cause. Make six or seven molds in the same flask and wet the edges of some, leaving the others on the dry side. Pour the castings with the same sprue and runner for uniform iron in all castings.

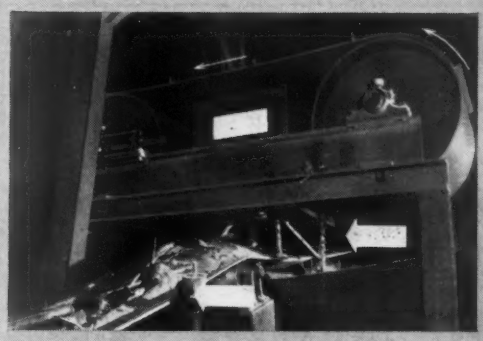
There is another method that can be followed to correct the difficulty. Suppose the castings have to be machined ⅛-in. In this case, all the corners can be rounded by removing 3/32 of the corners and eliminating all sharp corners which are likely to be chilled. This will leave enough metal so that the castings will have sharp corners after machining. Of course, the change must be made on

(*Concluded on page* 82)



Dings Non-electric, Permanent Perma-Pulley.

1. 2.



Dings Extra Powerful Self Cleaning Rectangular.

3. 4.

Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks"*. Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

NAME.....

COMPANY.....

ADDRESS.....

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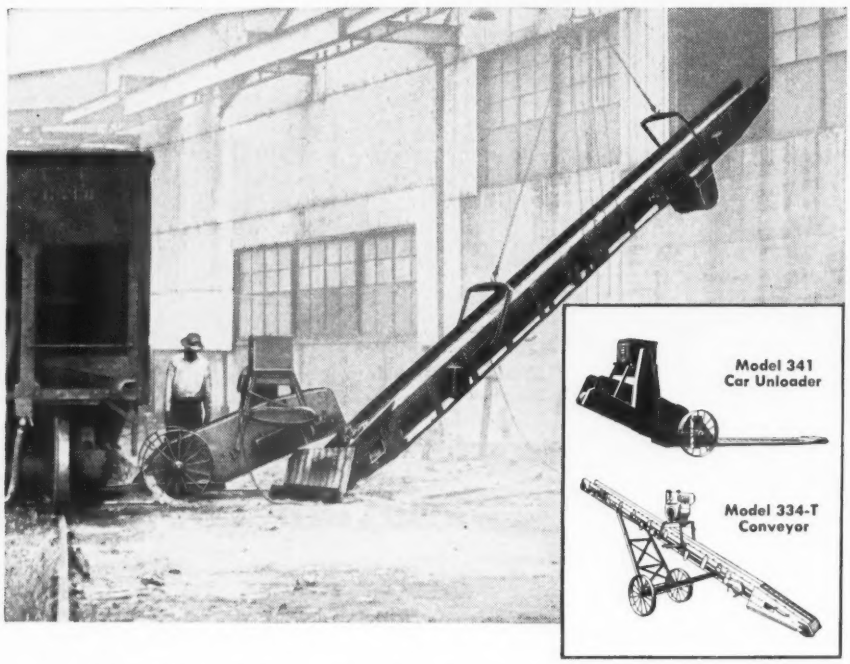
One in a series of factual reports from owners of Farquhar Conveyors

FARQUHAR CONVEYORS CUT UNLOADING TIME BY MORE THAN 90%*

*at Pohlman Foundry Co., Buffalo, New York



BEFORE installation of Farquhar Conveyors, four men required eight hours to unload a 50-ton car of coke and sand at the Pohlman Foundry Company. Now, this Farquhar Under-Car Unloader and Conveyor team permits one man to do the job in three hours! Pohlman reports: " . . . unloading of only a few cars paid for the entire equipment."

Whether you move coal, gravel, sand, aggregates, cartons, boxes, bundles, bales, or any kind of bulk or packaged materials—horizontally or from floor to floor—Farquhar can cut *your* handling costs to rock bottom! One or more of the complete line of Farquhar portable, semi-permanent, and permanent conveyors will solve your handling problem. Our engineers will be glad to consult with you . . . at no obligation!

Farquhar CONVEYORS SAVE YOU MONEY

WRITE for complete information to A. B. FARQUHAR CO., *Conveyor Div.*, Dept. F-45, 142 N. Duke St., York, Pa. or 618 W. Elm St., Chicago 10, Ill

WORLD'S MOST COMPLETE CONVEYOR LINE

HYDRAULIC PRESSES • FARM EQUIPMENT • FOOD PROCESSING AND SPECIAL MACHINERY

(*Concluded from page* 80)

the pattern.

While I am in a writing mood, which is not too often, I wish to compliment you on the new covers of FOUNDRY which have improved its appearance greatly.

I always read FOUNDRY with a great deal of interest. In the December issue on page 222, I find the face of an old friend, Carl Erickson, who was shown attending the New England Regional Conference. Carl and I went on a visit to Sweden together in 1912.

B. FROBERG
Foundry Foreman
Foreningen Sundbybergs Gjuteri
Sundbyberg, Sweden

* * *

Saludo en Espanola

TO THE EDITORS:

In the November, 1951 FOUNDRY, page 286, under the title "Thots for Today from The FOUNDRY Business Staff," you presented a greeting in the Spanish language which greatly pleased foundrymen at home and abroad who speak, read and write the Spanish language, En Lengua Espanola. A translation is good, but every man loves the mother tongue in which he was born.

In the foundry with which I am connected as an industrial adviser, or, as you might say, a specialized engineer, we read FOUNDRY every month. All the articles are interesting, and many furnish solutions to problems that constantly arise in the operation of a small gray iron foundry. I shall appreciate your kindness in sending me the booklet "Glossary of Foundry Terms" mentioned in your message.

MIGUEL ALIMBAU
Calle Bruch, No. A 29-20-2*a Manresa*
Barcelona, Spain

•

TO THE EDITOR:

Compliments to you and staff for the wealth of information provided in your articles, editorials and comments each month. The information is of great value.

I would greatly appreciate a copy of your "Glossary of Foundry Terms."

JACK E. HECKER
529 *N. Market*
Troy, O.

* * *

A Ralph Lee Fan

TO THE EDITORS:

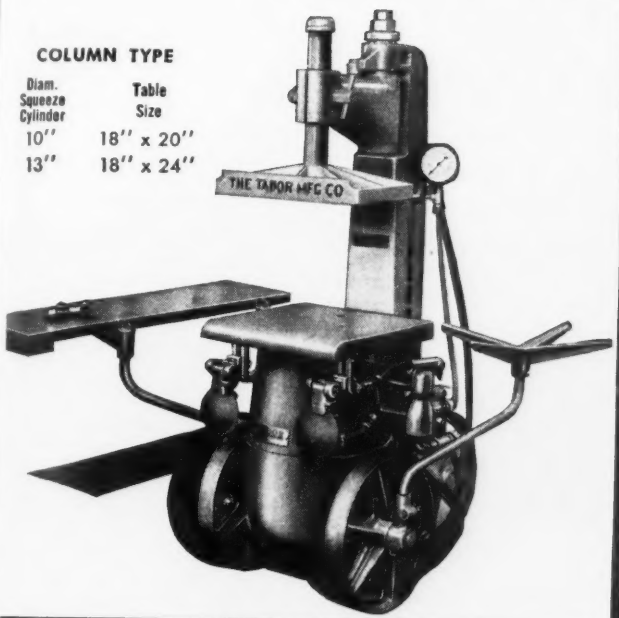
Keep those Ralph Lee articles coming. He is educational and inspiring, a real down-to-earth guy.

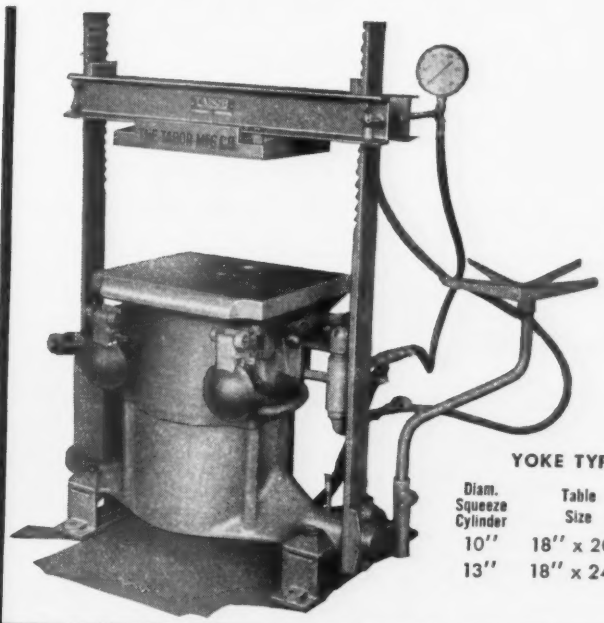
H. DURWOOD BUTTS
Lynwood Custom Craft Foundry
Brownville, N. Y.

There's a Tabor Squeezer to fit the job!

COLUMN TYPE

Diam. Squeeze Cylinder	Table Size
10"	18" x 20"
13"	18" x 24"





YOKE TYPE

Diam. Squeeze Cylinder	Table Size	Space Between Uprights
10"	18" x 20"	32"
13"	18" x 24"	36"

TOP-SQUEEZE TYPE

Diam. Squeeze Cylinder	Table Size
10"	16" x 19"

(Also available in portable or portable sand-straddler types)

CANTILEVER TYPE

Diam. Squeeze Cylinder	Table Size
10"	18" x 20"
13"	18" x 24"

The **TABOR** *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

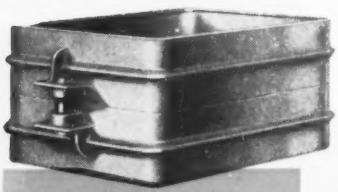
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

Sterlings are Built to RIGID SPECIFICATIONS

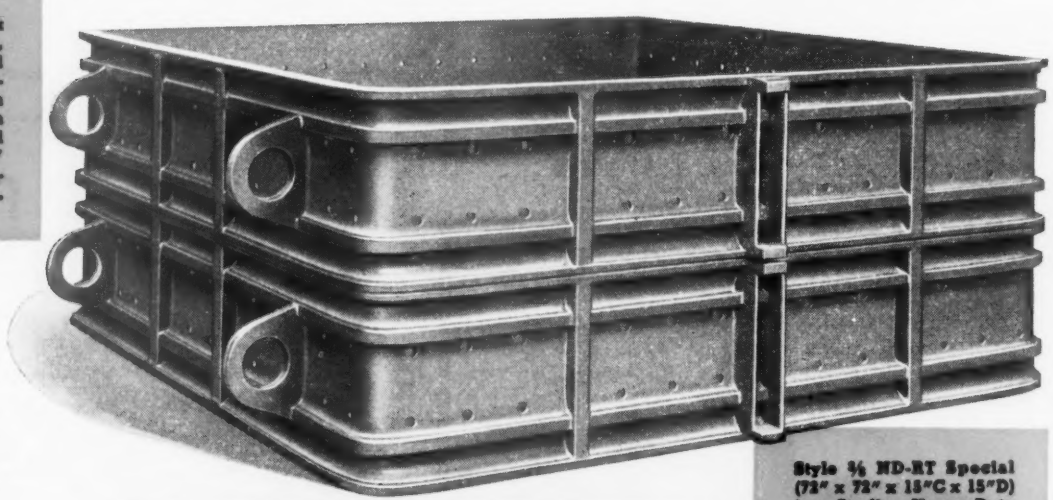
There's a STERLING STEEL FLASK for every type of molding. Whether you need small or large foundry flasks, there are Sterling Steel Flasks to meet your specific job requirements. Every Sterling is constructed to give you a maximum of strength with minimum weight. Even under rough usage, you are assured of obtaining both accuracy and speed in molding. This is possible only because Sterling Steel Flasks are built to rigid specifications according to modern engineering design. They are backed by almost a half century experience fabricating quality foundry flasks. Write for new Sterling Catalog No. 60.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

TINY BUT TOUGH!



Sterling Style "E" Flask is designed for tough, small and medium sized work. It is especially popular in brass and iron foundries. Available with interchangeable copes and drags having depth of 2½" and up. Built with combination pin lugs and handles.



Style ⅜ MD-RT Special (72" x 72" x 15"C x 15"D) is a Sterling Heavy Duty Flask with special reinforcing strips on both cope and drag. Its easy, light handling for a flask this size, makes it particularly practical for use in high-production grey iron foundries.

Consult Sterling when in need of foundry equipment. Send for your copy of Sterling Catalog No. 60, just off the press.

LARGE BUT LIGHT!

MORE THAN 4000 FOUNDRIES USE STERLING FOUNDRY EQUIPMENT

Better Communications Needed

ONE reason for our military might in World War II was the speed with which industry reached mass production, once military orders had been placed and the tooling up job completed. Why, then, do we seem to hesitate, stumble and perhaps make unnecessary mistakes in the present mobilization effort?

While industry has more "know-how," advanced production techniques, greatly improved plant and a much better product, compared with ten years ago, government has refused to heed the lessons evolved so painfully by trial and error methods during the previous emergency.

From time to time FOUNDRY has pointed to situations created by the Defense Act and administration of that law which appear to be contrary to the best interest of rapid and efficient defense mobilization, as well as the future welfare of the industrial establishment. Special emphasis has been placed on the impact of these gyrations on the foundry industry. But other factors are having a profound influence on the effectiveness of present defense preparations. For example, it has been apparent for some time that the Department of Justice is providing impediments which are hampering greatly the ability of American industry to perform its greatest service to the nation in time of peril.

Ten years ago, a system of communication for confidential information dealing with war work, based on a committee setup, provided one of the important reasons for the speed in reaching mass production. Where a number of companies were making the same product, government encouraged organization of an integrated industry committee composed of the best technical and engineering talent of these organizations. Because the military materials being produced generally required different specifications, production techniques and equipment, these men met frequently to develop methods and exchange production data. In this way, manufacturing practices for the entire group were developed quickly.

But this time the Department of Justice, with great zealousness for purity in all operations, frowns on business men working on the government side in getting this job done. The Department, with the assistance of the President, fought against using the "loaned" business executives in the defense agencies, and this kept many able men from serving. It destroyed the effectiveness of the industry advisory committee setup of the Munitions Board by banishing industry chairmen. And it has hesitated to sanction these integrated industry committees of war contractors.

So each company does all of the work of getting the job in production, and each probably makes the same mistakes.

When the Congress is looking at the Department of Justice, it might study the effect of some of these interpretations of law on the success of our war of survival.

Frank G. Steinbach

Editor

Steel Founders'

MARKS FIFTIETH

As one of the oldest national trade and technical organizations, the Steel Founders' Society of America has performed a vital role through the last half century of tremendous progress in the steel casting industry. The story of the society, in fact, comprises a blueprint of parallel growth and development for the industry. Here are the high lights of a unique partnership in progress

THE casting of metals dates back into antiquity, but it was little more than a century ago that men mastered the art of casting steel. The first steel castings were church bells, and those bells rang out the portents of a challenging new era of metallurgy for the future.

Steel castings first were produced in America in 1861—for railroad applications, prophetically enough. Pioneering use of the crucible melting furnaces was followed by introduction of the open hearth in 1870 and the Bessemer converter in 1881. Various types of electric furnaces were to come much later.

Developments in the railroad field during these years of the waning century had an important effect on the acceptance and use of steel castings. But progress was relatively slow, as measured on the industrial yardsticks of today.

Ahead lay a half century of phenomenal growth and development and emergence of the steel casting industry as a major factor in the building of industrial America. Ahead were vast technical advances, expansion of production facilities, and integration of industry in the making of new and better products.

As America turned the corner into the Twentieth Century, Uncle Sam was beginning to flex powerful industrial muscles. The nation was a young giant with plenty of potential; real technological skill, however, was still pretty much a thing of tomorrow. Brilliant advances in metallurgy and production were yet to come. Few alone could undertake the burdens; but men were learning to work together. In the fertile soil of these formative times was implanted the potent seed of voluntary co-operative effort—and in what grew out of the tiny seedling is the reason for and the substance of what follows.

It is, in outline, the 50th anniversary story of the Steel Founders' Society of America, and the parallel story of a half century of dynamic advance in the steel castings industry. The two indeed are inseparable.

Now the recognized voice of the steel castings industry, the society grew out of the informal luncheon meetings of a small group of steel casting pioneers, beginning in 1902. It is the only national technical and trade organization in the United States representing exclusively producers of carbon and low alloy steel castings. Every such producer has a right to join. One of the oldest national trade associations, as well, the society is independent in its operations, an unincorporated, voluntary membership, and nonprofit organization.

Through the five ensuing decades of engineering and production advance since 1902, the Steel Founders' Society of America has fulfilled an increasingly important role. Now encompassing a majority of the more than 300 steel foundries in North America, its membership represents over 90 per cent of actual productive capacity. Its usefulness reaches into Canada, and extends into Mexico.

As the hub of forceful industry leadership, the society is and has been the continuing medium of

Small molds from squeezer machines being poured on roller conveyors at Unitcast Corp., Toledo, O.

rsociety

E TNNIVERSARY

Pouring a 232-ton steel casting at the New Castle, Pa., foundry of United Engineering & Foundry Co.

impressive research undertakings, and valuable product activities of benefit to many industries. It is the authoritative source of extensive technical data on steel foundry products and processes. It provides many special services, informational guidance, and other functions of lasting value to individual member steel foundries, their customers, and the industrial community as a whole.

During these 50 years of growing influence and usefulness, the society has taken the lead in fostering the adoption of many new and improved technical practices. By its employment of intensive educational effort, it also has helped to build solid and lasting recognition of the intrinsic advantages and economy of steel castings. And with this vast expansion in the use of steel castings has come a comparable growth in the industry's production capacity, new emphasis on mechanization and modernization, and greatly improved working conditions in steel foundries everywhere.

Steel castings today are vital in supplying the needs of more than 100 leading heavy industries. In many instances they are indispensable. Among the many society services and activities to which these factors of growth and development of the industry are closely related, perhaps none has been of more far-reaching importance than the intensive program of co-operative research which has been a keystone of society progress for many years.

In the results of this activity are reflected the steadily expanding applications of scientific research to products and processes. The society's research program starts with the individual foundries and culminates in the work that is done in the major research laboratories and engineering colleges, under society supervision. The results of these many and varied undertakings are incorporated in every-day practice, and in turn have resulted in tremendous improvements in the quality of cast steel products.

Two classes of research projects are maintained by the Steel Founders' Society: Fundamental studies on the properties of cast steel and steel castings; and product research. Projects fundamental in nature are undertaken to increase the knowledge of cast steels so that the casting purchaser, the engineer, the student and the foundryman will have available more basic information on cast steel properties, and thereby be more familiar with the established advantages of using steel castings. Product research projects are formulated with the objective of increasing the quality of steel castings, and to assist steel foundrymen with production problems.

Considered collectively, the SFSA research program has been responsible for noteworthy improvements in metallurgical and operating methods and practices in steel foundries. Its influence and im-

portance pervades the industry, inspiring the development of improved production techniques, new products, and improved quality of existing products, better working conditions, and measures to insure the health and safety of steel foundry workers.

The results of fundamental research studies are published by the society and by various technical societies of the U. S., and appear in their published transactions. Findings of other research projects are disseminated to the steel casting industry and occasionally are submitted for broader technical publication. Certain of these continuing research studies have received national recognition from the entire steel industry.

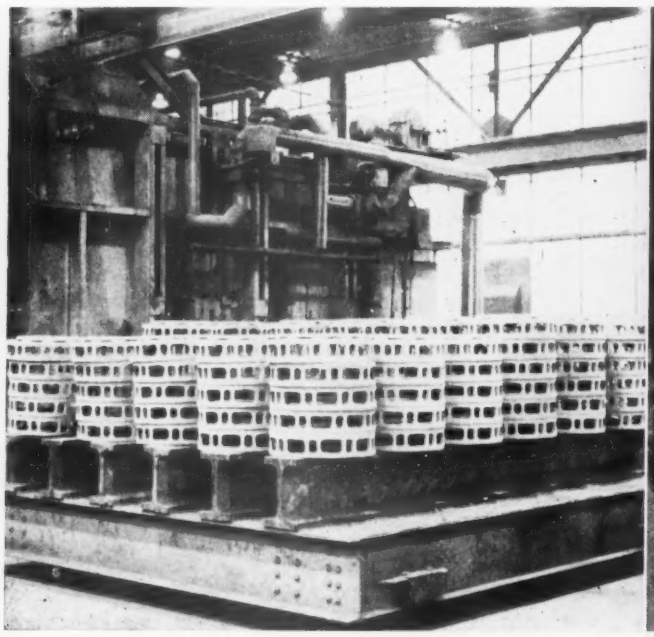
Among others, research on the properties of cast steels has resulted in the study of mechanical properties of low-alloy cast steels; low temperature impact strength of carbon and low-alloy cast steels; time-temperature transformation curves for use in the heat treatment of cast steels; effect of homogenization in the heat treatment of steel castings; austenitic grain size of cast steels; influence of microstructure on mechanical properties; weldability of carbon-manganese cast steels; studies of comparative engineering characteristics of steel castings and equivalent structures; reproducibility of the results of tensile tests on specimens prepared from cast steel coupons; the fatigue properties of cast steel structures; and the machining of cast steels.

Research on manufacturing processes has resulted in valuable studies, including: Critical dimensions of feed risers and riser efficiency; properties of core oils and binders and development of acceptance tests; investigation of mold washes; quantitative determinations on the feeding of steel castings; hydrogen and nitrogen contents of cast steels; effect of deoxidation methods on low temperature impact properties; investigation of surface finish of steel castings; constitution of discarded molding sands; mechanics of flow of molten steel in refractory molds; pressure feeding of steel castings; reclamation of expended steel foundry sands; and control of the solidification of steel castings by the use of various molding materials.

Developments of far-reaching importance to the industry and its customers similarly stem out of the extensive product development activities sparked by the national Product Development Committee and carried out at all levels of the industry. This comprehensive, continuing program has been the key to many valuable foundry-engineering advances. Emphasizing the importance of design based on sound engineering principles, it points the way to higher quality, lower costs and constantly increasing use of steel castings.

As in the instance of research and product development effort, much substantial progress of the society in other eminently practical and useful directions is attributable to the incisive work and diligence of its standing committees and special committees designated from time to time to study and report on specific matters of importance to the industry and its customers.

Among these, the work of the Education Committee has been highly productive. Primary purpose is to correlate and guide the work of the society's official contact representatives who maintain close relations with engineering schools and colleges. The committee also has jurisdiction over arrangements for special training courses for prospective management and engineering personnel, and supplements the activities of the Foundry Educational Foundation, of which the society is a charter member. The program now reaches into 128 engineering schools, with broad



Steel castings loaded on heat treating furnace car

Special cast steel fittings for petroleum industry

Small castings are handled in tote boxes as they move past chipping stations in this steel foundry

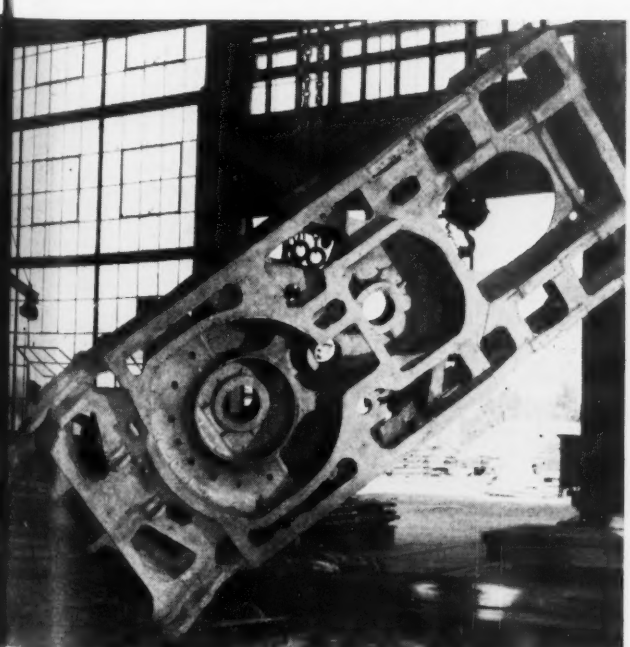
mutual advantage to students, faculties and industry.

Valuable advisory data pertinent to the maintenance of sound relations and negotiations with labor is developed by the Personnel Committee. As a clearing house of information, it implements the basic society policy that labor relations is primarily a local problem. Jurisdiction includes exchanges of wage rate data and information on labor agreements, incentive and job plan surveys; and formulation of programs on foremen education, exchange of data on shop rules and shop problems for development at regional levels.

Development and administration of the society's national safety program designed to effect progressive reduction in the frequency and severity of accidents in steel foundries is the national Safety Committee's primary objective. It is responsible for safety contests and awards, lost-time injuries reporting, the fostering of co-operative safety practice in all member foundry organizations, and for the development of numerous safety programs and studies for suggested action at regional and local levels.

All matters relating to steel casting specifications, including the drafting of suggested new or revised standard specifications are the province of the active Specifications Committee. The society is represented on all matters concerning specifications relating to steel castings and steel casting production before national specification writing bodies.

In another area of broad usefulness, the Statistical Reports Committee is responsible for statistical report forms used by members of the society, and for the format in which statistical summaries and information are issued by the society. Among statistical documents subject to committee review are the monthly statistical report, monthly statistical summary, quarterly and annual reports, and others. The committee also handles statistical problems on which government bureaus may request suggestions or rec-



Intricate steel casting used for machine tool base

ommendations, and the preparation of other authorized special studies or surveys of wide general usefulness.

Closely related to the functions of all committees and all general activities of the society is the work of the Advertising and Public Relations Committee, which is responsible for the society's program of advertising, promotion, publicity and public relations action. Under its supervision, impressive results have been achieved in expanding the field of general information on steel castings, and in building accumulatively greater recognition of the industry as a respected, vital and basic segment of the national economy.

Publications of the society serve another area of broad need and industrywide usefulness. Among them are the monthly statistical summaries, annual rosters and proceedings, and biennial publications such as the *Directory of Steel Foundries,* and the *Directory of Steel Foundry Personnel.* Along with these are *Steel Foundry Facts,* technical magazine published 10 to 12 times per year, the periodical technical research reports, and direct mail bulletins.

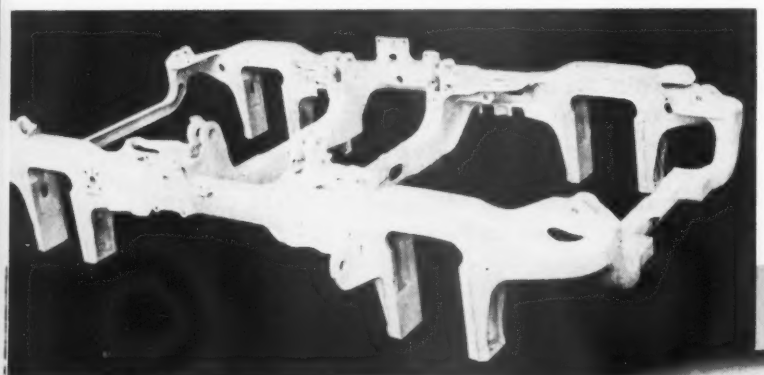
Of particular importance are such special publications as the *Steel Castings Handbook,* and booklets of general and specific interest and subject matter: "The Steel Castings Industry," "Fundamentals of Steel Casting Design," "Some Mechanical Properties of Steel Castings," "Developments Concerning the Properties of Cast Steel," "Cast-Weld Construction," "Recommended Practice for the Welding of Steel Castings," definitive sound-slide films, and other incisive literature, charts, and reprint materials.

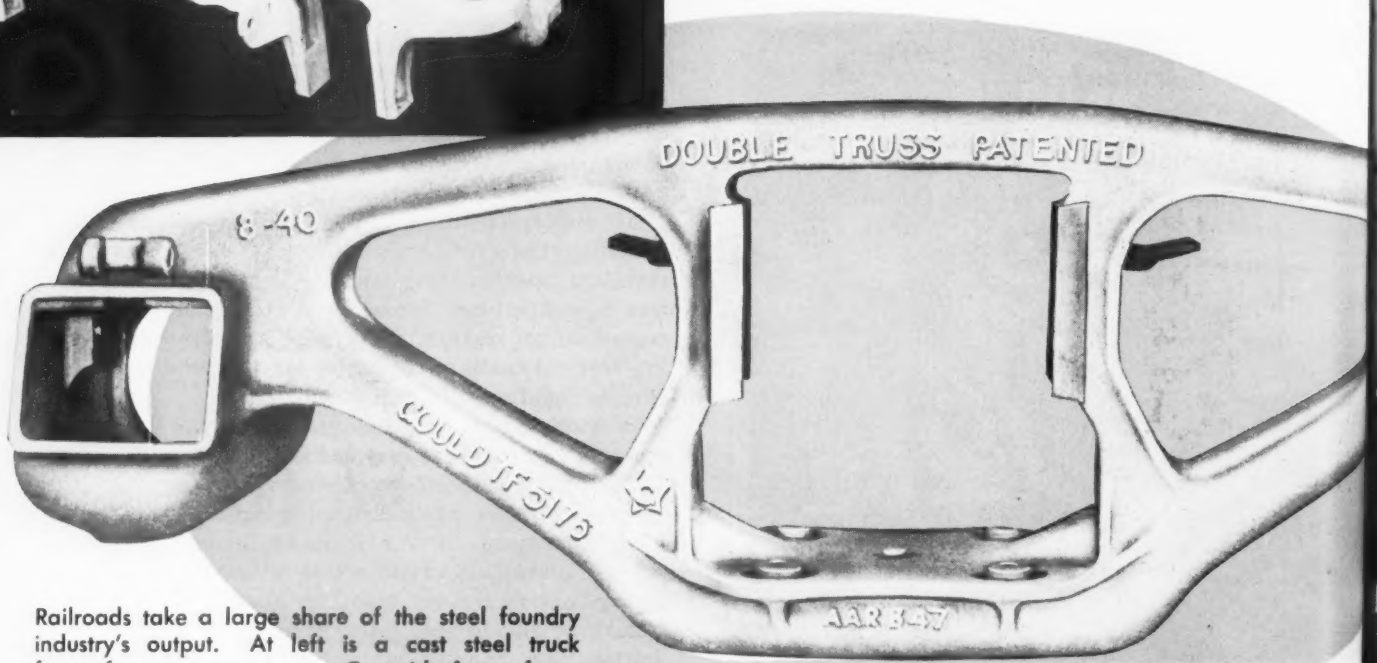
Steel Founders' Society of America, in summary, thus performs a continuing role of great essentiality for its members and for the many industries which depend on steel castings for an almost endless variety of products. As a tangible result of its varied activities, better steel castings are being made, year after year; and use of steel castings has come to be as broad as America itself.

From the steel foundries today flows a never-ending stream of castings, large and small, to take their places as integral and component parts in the products of almost every heavy industry. Saleswise, usage of steel castings is normally divided roughly in these proportions: Railroads and transportation, 35 per cent; machinery and tools, 25 per cent; rolling mills, 15 per cent; materials handling equipment, 8 per cent; valves, fittings, etc., 7 per cent; road and building construction, 5 per cent; miscellaneous, 5 per cent. Currently, it is estimated, at least half of all defense production is dependent on steel castings.

For each of these broad use classifications the inherent characteristics of steel castings—versatility, strength, dependability, and economy—provide a continuing valuable means of helping to build the nation's industrial strength; and society action has been a significant force in building general understanding of the many advantages and ultimate expansion of uses.

Where dependability counts, in critically important parts of railroad stock, for instance, the list of steel casting applications is legion—driving wheels, truck





Railroads take a large share of the steel foundry industry's output. At left is a cast steel truck frame for a passenger car. Cast side frame for a freight car truck at center. Car coupler at right

Inspection department layout room of a steel foundry. Castings are checked for dimensional accuracy

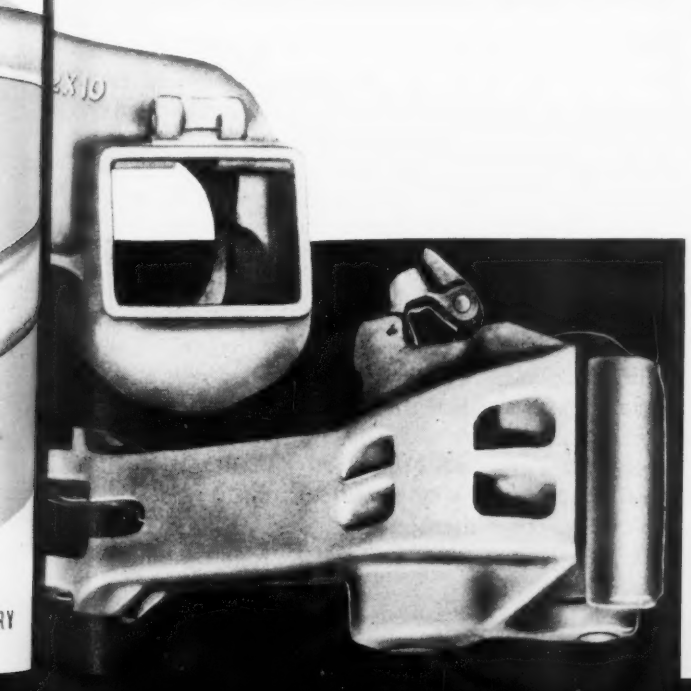
frames, cylinders, couplers, bolsters, side-frames, yokes and draft gear, etc.

The resilience and uniform structure of cast steel are important advantages for aircraft applications, engine parts, fuselage supports, gears and brake housings, landing mechanisms. High strength and resistance to wear and shock mean wide use of steel castings for many motor vehicle needs. Durability and wear-resistance in heavy duty service account for their use in earth-moving equipment, in the teeth of power shovels, road machinery gear mechanisms, and the critical parts for bulldozers, excavators, draglines, dredge pumps, of every description.

Ability to withstand high temperatures and pressures, and resistance to corrosive action result in similar wide use of steel castings in many phases of petroleum industry operations. Ready weldability is an added advantage.

Steel itself can not be made without steel castings; the highly technical and exactingly developed equipment of the rolling mills and blast furnaces and other forming processes depend upon them. The same is true in the case of much metalworking equipment.

In the engines, motors, turbines, generators, compressors, valves, fittings and cylinders of power and electrical equipment, the strength and creep resistance of steel castings, their weldability and wear resistance similarly spell wide usefulness.



And of prime importance in time of industrial mobilization for defense, steel castings play a vital role in fulfilling many exacting engineering requirements for naval and marine applications, and for tanks, guns and gun carriages, military transport on land, at sea, and in the air—and many other ordnance requirements to make America invincible.

Tremendous improvements in the quality and variety of steel castings, reflected in the mushrooming demand developed during the 50 year period of Steel Founders' Society influence, have brought the parallel of remarkable growth in the industry's production capacity, and methods of management.

Keeping pace with physical growth, there has been similarly extraordinary growth and advance in almost every phase of steel foundry production practice—metallurgical controls, patternmaking and sand handling methods, molding and coremaking, melting practice, pouring and shakeout, cleaning and finishing, testing and inspection, heat treating and machining, etc. Industrywide mechanization has brought vast improvements in working conditions as well as obvious technological gains—and the emphasis on modernization continues. Steel castings today are meeting service requirements not even dreamed of back in 1902.

Beginning with a few tons in Civil War days, steel castings production increased until the industry was making about 200,000 tons per year, with a value of about $14\frac{1}{2}$ million at the time of the society's founding. By 1914, commercial production had passed the half-million mark, and closely approached a million tons during World War I. The next peak year was 1929, when production totaled 1,531,000 net tons.

The peak of 2,445,000 net tons was reached in 1944, at the height of all-out production effort to meet World War II requirements, and 1948 brought another high mark of 1,759,000 tons.

Again, with the advent of the national defense program following the Korean outbreak, the pattern during World War II was re-established. Demands for steel castings for direct military and defense-supporting requirements (*Please turn to page* 249)

Limited Mechanization

IN THE JOBBING FOUNDRY

By EDWIN A. SWENSSON
Foundry Engineer
National Engineering Co.
Detroit

FINDING a way to keep his foundry in sound financial condition through the peaks and valleys of the business cycle is the goal sought by every foundryman. This applies to production as well as jobbing foundries, and concern should be felt when little attempt at cost reduction has been made during a prolonged period of peak operations.

Two views are generally held by foundrymen when the curve begins to drop off: One is a sense of apparent good fortune in not having the amortization cost for foundry improvements over their heads during the valley period. A foundry without this burden may be able to work two to four days a week without grave financial danger.

Quite the opposite reaction, hower, comes from foundry operators who know that purchasing agents are still placing attractive orders for castings, but at highly competitive prices. A foundry that can

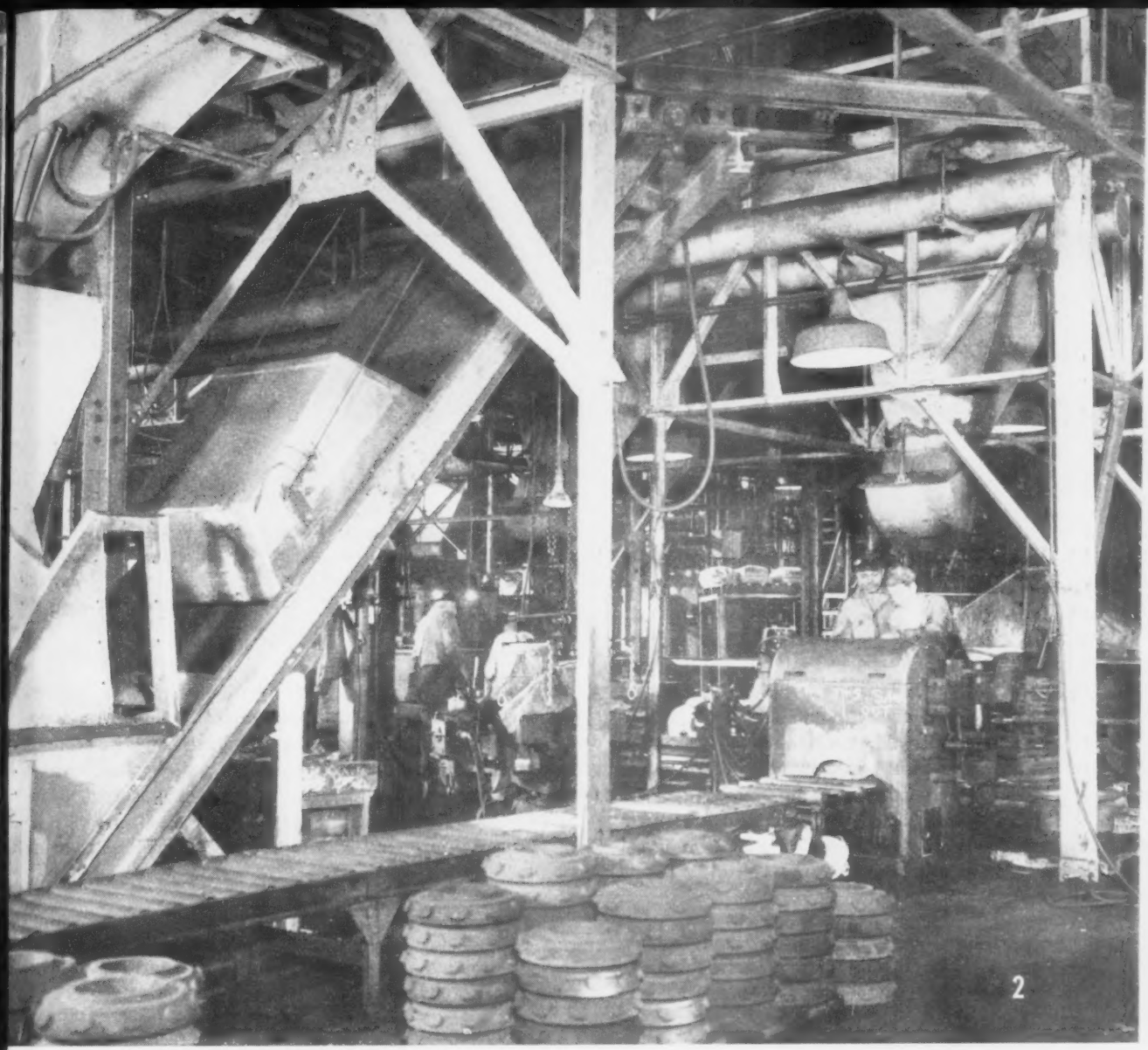


Fig. 1—No. 1 individual mechanized molding unit. Flasks are returned to molders from the shakeout. One overhead hopper feeds the drag rollover machine, the other feeds the cope pin-lift. Sand mixer is positioned directly over the two hoppers

Fig. 2—Drag rollover machine permits the drag to roll out on a conveyor to a core setting station. Here the cope is closed on the mold. This view also shows inclined bucket which charges screened shakeout sand to mixer above the molders' hoppers

produce at the lowest cost can see unlimited business during a period of apparently low over-all demand.

For many foundries, operations today are somewhere in between the top of the peak and the bottom of the valley. With costs of materials at fixed, or at nearly fixed, levels, with fixed overhead and in the face of progressively increasing labor costs, only one factor will permit reduced costs in the end product. This is increased production.

To obtain this means mechanization. And while mechanization, meaning a program including all production departments, may be neither physically nor financially impossible in a semiproduction or jobbing foundry, it embodies disadvantages and distinct dangers. A mechanization program throughout the foundry may cost enough to impose an unbearable burden when something less than full operations is scheduled. This type of mechanization, furthermore, may not allow the extreme flexibility of operation so necessary in a semiproduction business. But one part of the desired solution is certainly made possible through mechanization: Unit production per man-hour can definitely be increased.

What, then, are the possibilities of getting the salutary effects of mechanization without also incurring the deleterious ones? Good, say many jobbing foundries which have tried limited mechanization.

Breaking down the operations of the molding departments and classifying them we have four distinct groups: (1) Bench or floor molders, (2) squeezer machines, (3) cope and drag teams, and (4) large floor work. It is financially possible and economically practical to mechanize any one or all four of these on an individual basis.

One of the features of working an individual molding unit into maximum efficiency is that the sup-

Fig. 3—Pouring is done at the weight station. Roller conveyor encircles large floor area and can be used for mold storage if intermittent pouring adopted. Sand storage bin in background

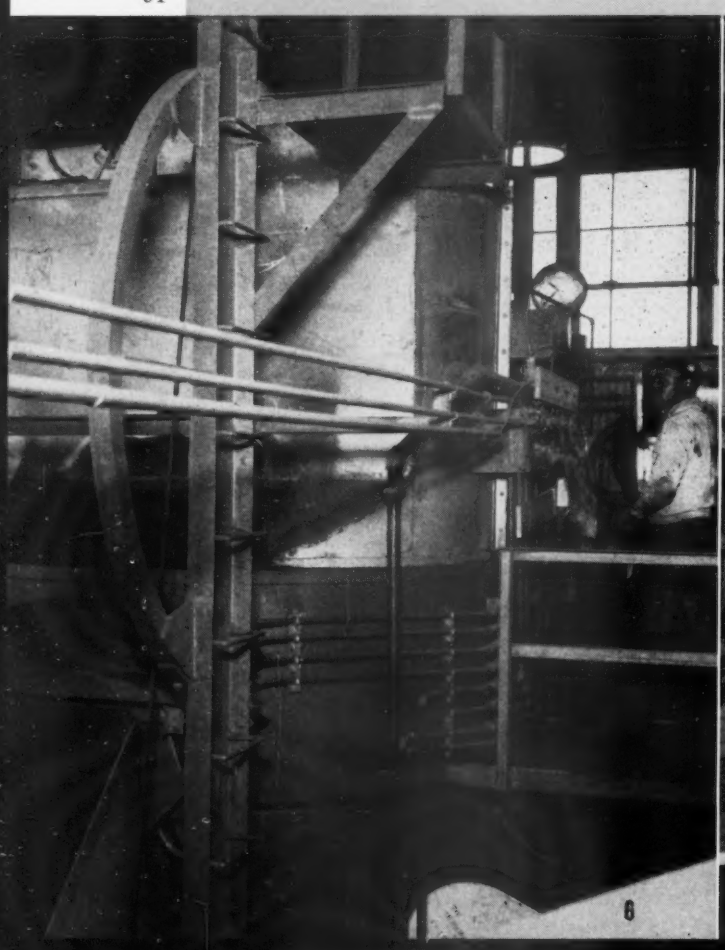
porting departments can usually absorb the increase in production with a minimum of changes. Care must be taken, however, in outlining the program to maintain a proper balance between all departments. Once such a program has been laid out and begun the financial benefits which accrue can be applied to strengthen additional departments, until ultimately efficiency has been improved throughout the foundry.

This type of department-by-department mechanization has been successfully put into operation by General Foundry & Mfg. Co., Flint, Mich., a gray iron foundry whose castings are used by a variety of industries, and range in size from 1 to 300 lb. Three of the four steps in its mechanization program have been completed and the last phase has now been started. A complete range of flexibility allows it to produce castings from any type of pattern equipment.

Description of two of these steps—mechanization

Fig. 6—Sand mixer is equipped with cooling hood. Uniform moisture in sand is obtained throughout the day by automatically calibrating additions to temperature of return sand

Fig. 7—Weights and jackets are shifted after pouring. Floor area encircled by mold conveyor will permit molds to be set off temporarily in event continuous metal is not available



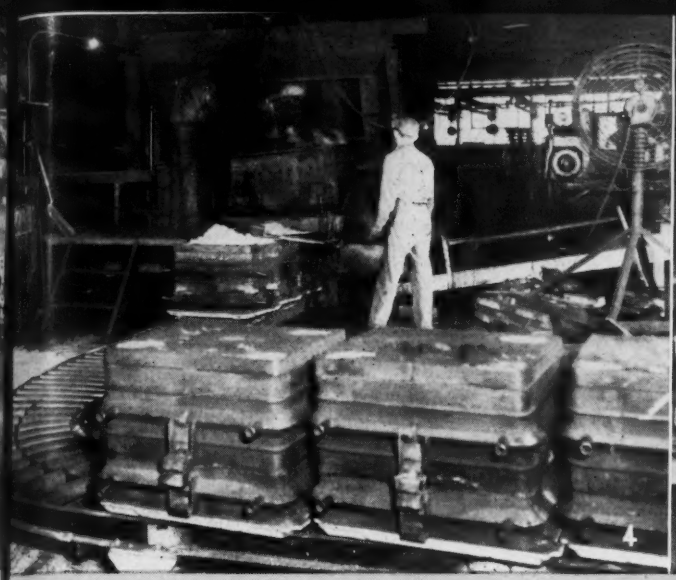


Fig. 4—Molds are elevated to vibrating shakeout, which delivers castings directly to the cleaning room. Flasks are returned to the molding stations by means of gravity roll conveyor

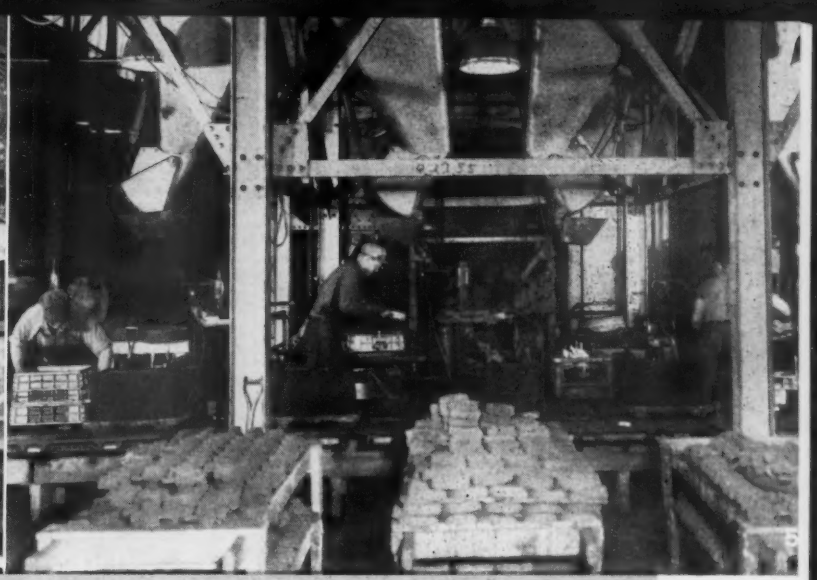


Fig. 5—No. 2 mechanized, four-station molding unit. Each squeezer machine fed by individual overhead hopper. Double discharge mixer permits four different types of sand to be used

of cope and drag teams, and of the squeezer operation —follows:

No. 1 Mechanized Unit—One phase of the program was to install an individual mechanized unit for one team of cope and drag molders. The result of this unit was to increase production and substantially reduce the indirect labor. This team now produces the volume formerly requiring four teams using the old method of operation.

Two pairs of machines formerly were employed, working separate floors. Each pair had a helper and a team to set out the molds. Six hours of mold production and pouring of their own work was considered a normal day's work. Shakeout was done at night, and included castings separation and handling, and the operation of the sand cutter. Facing sand was prepared during the day and delivered to the teams.

Fig. 1 shows the indi- (*Please turn to page* 247)

Fig. 8—Vibrating shakeout can be used with automatic dumping of mold car trays, manual dumping as shown below, or tight flasks can be handled by means of overhead jib crane

DEVELOPS FOUNDRY Apprentice P

By PAT DWYER
Engineering Editor
FOUNDRY

IN LINE with an extensive advancement program, including mechanization, and practical scientific control of materials and methods, the Fulton Foundry & Machine Co., Cleveland, has inaugurated an apprentice training program for the development of all-around molders and coremakers.

The plan has been in operation long enough to indicate that the basic idea is sound and commendable. It has the active support and approval of both employer and employees, including the first apprentice group of 12 now undergoing initiation. Conceived and roughed out by A. C. Denison, president of Fulton Foundry, details of the program and subsequent supervision have been handled by John N. Davenport, assistant to the president. The accompanying data sheets show how the office maintains constant information on the progress of each apprentice.

The plant timekeeper easily keeps track of each apprentice as he is moved from one type of work to another. The hours worked each day by the apprentice under the appropriate department heading is entered on the form "Tabulation of Apprentice Time." At the end of each week the form is submitted to the office and the total time worked in each department is recorded on the "Weekly Time Data Sheets" made up in advance for each apprentice, one for a molder and one for a coremaker. The work week is figured at 40 or more hours. Figures on the sheet show the total number of weeks required in each department and serve as an aid in directing the superintendent when and where to change the apprentice. At a staff dinner celebrating completion of the course each apprentice graduate will be presented with a framed diploma.

The molder apprenticeship course includes the production of molds on a bench, foundry floor, or in a pit. The training period extends over four years, or 208 forty-hour weeks. In addition to the actual shop work the apprentice is given opportunity to understand related operations, also supplemental instruction in school and outside reading. During the training period the apprentice is moved from one job to another. He spends from 48 to 58 weeks molding miscellaneous type work in the green sand department, commencing with simple shapes and gradually advancing to more difficult work as his skill increases.

Periods are divided approximately as follows: Squeezer molding 9 weeks, jolt-strip molding 9 weeks, loose pattern floor molding 9 weeks, loose pattern bench molding 22 weeks, mounted patterns bench molding 9 weeks. He spends 6 to 8 weeks in the pattern shop to learn basically about various types of patterns, repairs, gating and mounting, construction of flasks, bottom boards, etc. Coreroom experience is gained in 24 to 32 weeks, working on small and medium size cores and assisting on large, heavy cores. He learns the principles of coremaking, how cores are prepared for use, material and engineering requirements of good molding technique. He is on the coremaking bench approximately 12 weeks, operating the core blowing machine 2 to 4 weeks, and coremaking on the floor 16 weeks.

TABULATION OF APPRENTICE TIME

NAME _____ CLOCK NO. _____

WEEK ENDING _____

	GREEN SAND DEPARTMENT					PATT. SHOP	CORE ROOM			SIDE FLOOR, DRY SAND DEPT.			HEAVY FLR. DRY SAND	
DAY	SQUEEZER MACHINES	JOLT-STRIP MACHINES	LOOSE PATT. FLOOR	LOOSE PATT. BENCH	MOUNTED, BENCH		BENCH CORES	CORE BLOWERS	HEAVY CORES	MOLDING FLOOR	FINISHING FLOOR	CLOSING FLOOR	MOLDING FLOOR	CLOSING FLOOR
MON.														
TUES.														
WED.														
THU.														
FRI.														
SAT.														

Form used by plant timekeeper to record hours worked each day by the apprentice in the various departments

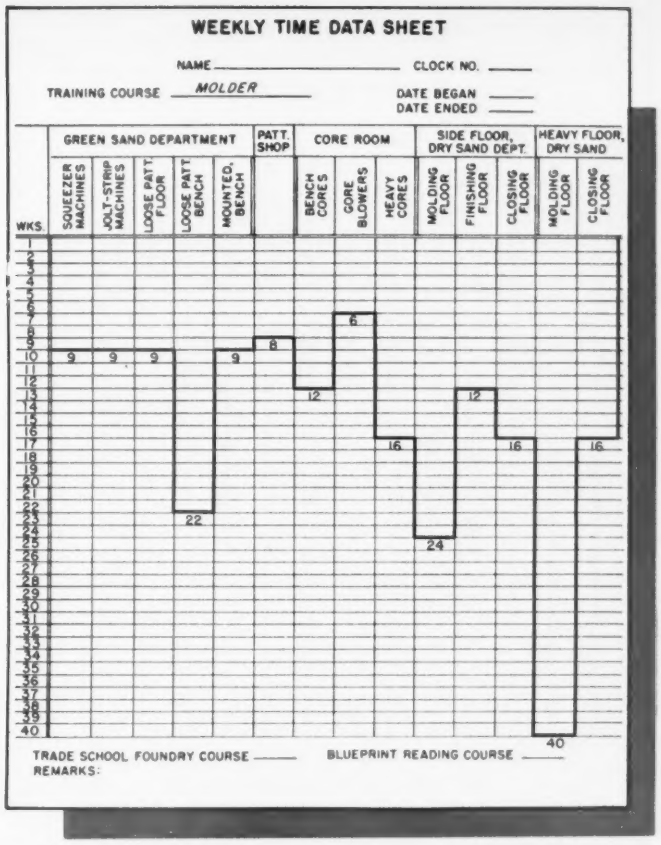
Program

He is on the dry sand molding floor for 80 to 120 weeks, first on small molds and then with journeymen molders on molds for castings up to 20 tons. He gains experience setting cores in large engine cylinders, machine tool castings, jacketed chemical industry castings, etc. Should the apprentice show a desire to specialize in any particular line he is given the time and the opportunity to improve his skill and acquire experience. He is introduced to loam molding practice when an occasional loam mold is constructed.

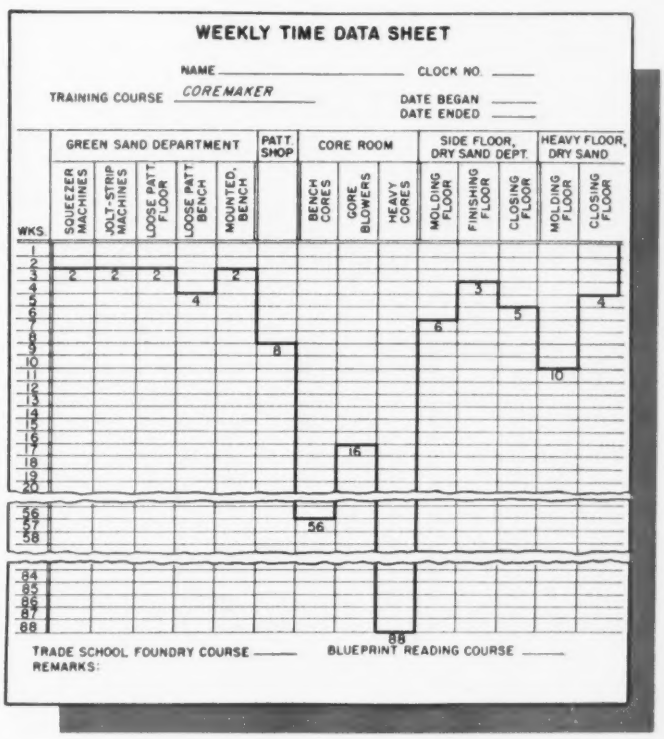
In the dry sand molding department the 40 to 60 weeks allotted to side floor work is divided as follows: Pattern set-up and sandslinger floor 24 weeks, pattern drawing and finishing floor 8 to 12 weeks, core-up and closing floor 16 weeks. On the heavy dry sand floor the apprentice is engaged for 40 weeks on the sandslinger molding floor, 16 weeks coring and closing the molds.

During the four-year training period the apprentice will learn by instruction and experience how to make mold partings, how molds should be rammed and vented, how gates and risers should be placed for proper entrance of metal and for feeding liquid shrinkage, how cores should be placed, vented and secured, requirements of a good mold or a good core, technique of blacking molds and cores. He learns how to secure molds to resist liquid metal pressure, how to make proper pouring basins, causes and preventives of casting defects, pattern requirements from a molding standpoint, how to finish molds, etc. At intervals the apprentice will be required to make sand tests, not only to acquaint him with the apparatus, but to acquaint him with the importance of sand control on the physical properties, moisture, green compression strength and green permeability. These and other features are essential in the repertoire of a skilled, all-around jobbing molder.

The company places each apprentice, both molder and coremaker, on the FOUNDRY subscription list for the entire four-year period. In addition, he is urged to attend night school classes at Cleveland Trade School for at least one year, also to study blueprint reading for at least one period either at the Trade School or at John Huntingdon Polytechnic Institute. The company also contemplates at least six instruction sessions after work hours, supervised by the president or the foundry superintendent. At these informal sessions fundamentals of cupola practice and control, quality controls and standards, gating and risering technique, mainte- (*Please turn to page* 255)



Data sheet for apprentice molder on which the time worked in each department is recorded. Figures in columns show weeks required for each type of work



Similar sheet is used for apprentice coremaker, but time spent in various departments is different. Entire program covers 208 forty-hour weeks

By EDWIN BREMER
Metallurgical Editor
FOUNDRY

Hardware Castings Produced in Modern Nonferrous Foundry

ABOUT the middle of 1951 the Attwood Brass Works, Grand Rapids, Mich., moved into its newly constructed plant which, in addition to a foundry department, houses pattern shop, machining and plating departments. The firm produces a wide variety of nonferrous hardware for the marine, automobile, bus and taxicab fields, weighing from a few ounces up to several pounds, as well as numerous jobbing castings. Extent of the firm's own line of hardware may be gathered from the fact that some 4000 different patterns are in use during the year.

Castings are made from a number of alloys including aluminum, manganese bronze, tin bronze, brass, bearing bronze, etc. Majority of the products are sold in polished or plated finish, and hence considerable care must be taken to insure production of not only sound castings, but also castings with smooth surfaces free from any discontinuities. It might be pointed out that where a polished or polished and plated finish is required, a smooth surface is essential to hold "cutting down" or rough polishing operations to a minimum, and the same applies to discontinuities such as sand pits, pinholes, cold shuts, surface blows and shrinks, etc.

Since the rough polishing operation tends to cut through the casting skin, such internal discontinuities as subsurface pinholes caused by gases absorbed by the metal during melting, and interdendritic shrinkage resulting from incomplete feeding of certain sections of the casting, are sharply revealed. As such discontinuities cannot be repaired the castings containing them must be discarded. Consequently, close attention is given to melting and the gating and risering methods to keep troubles from those sources at a minimum.

Foundry department of Attwood Brass is located along one side of the plant building as shown in Fig. 1 and occupies an area 54 x 195 ft in what is termed the north bay. A railroad siding just outside the exterior wall permits easy unloading of all raw materials such as ingot, sand, etc., through openings directly into storage bins arranged along the interior of the wall. To simplify further the handling of metal, the melting units are located directly in front of the storage bins.

Melting equipment includes five pit-type furnaces, three tilting crucible and one stationary crucible furnace. All furnaces are oil-fired. The pit type units hold No. 60 crucibles while the others use No. 325 crucibles. Most of the aluminum is melted in the stationary furnace. To prevent heat and fumes gen-

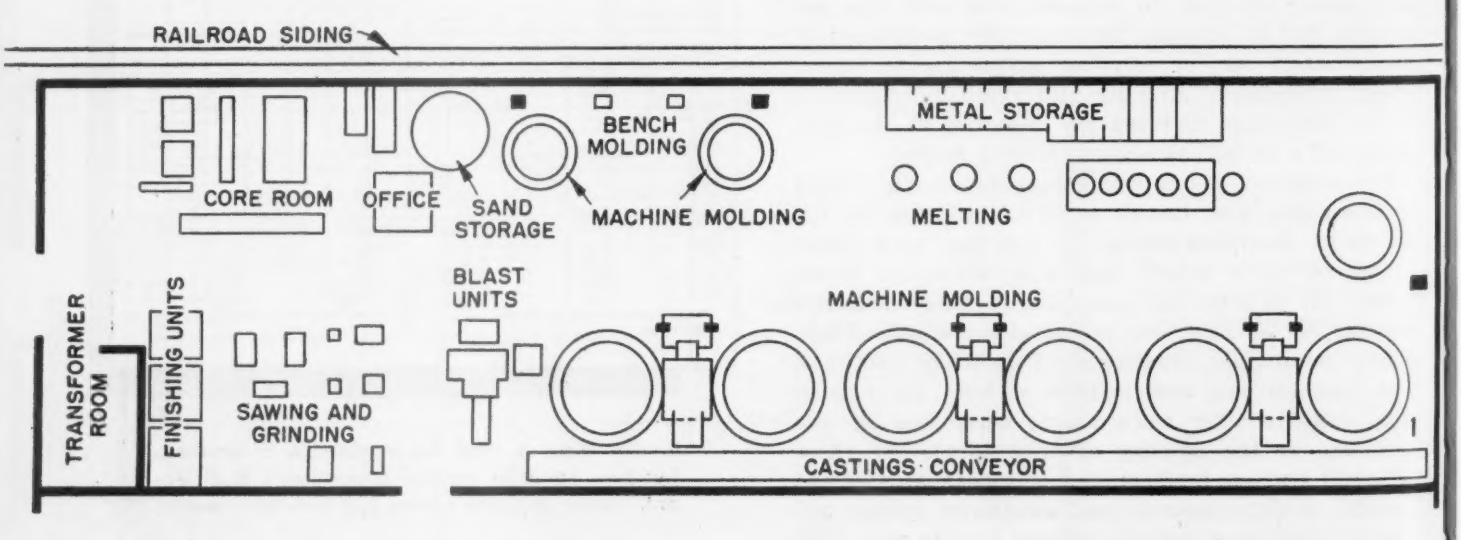


Fig. 1—Plan of the foundry showing the general arrangement of equipment and various departments

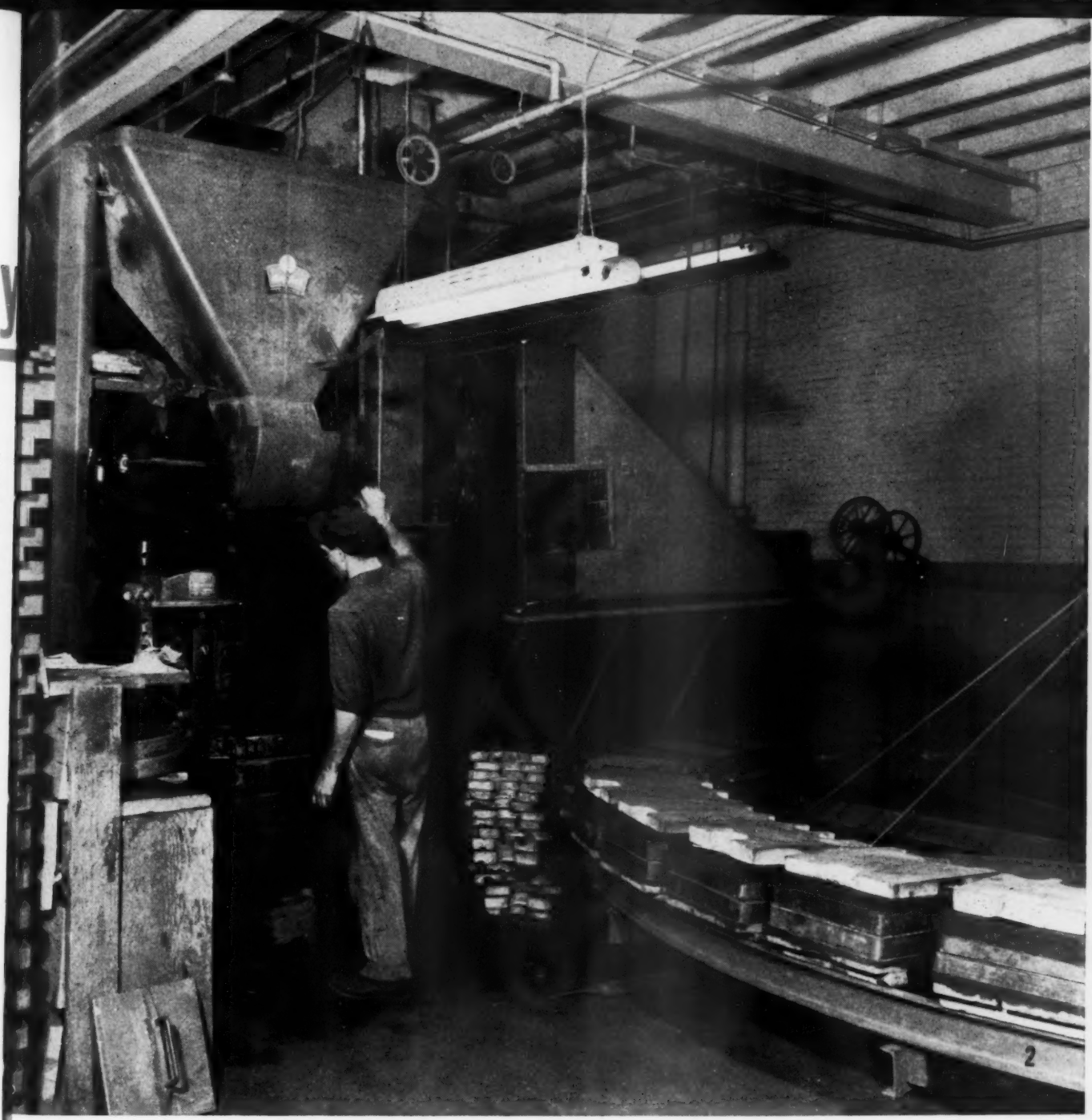


Fig. 2—View of one of the molding stations with sand handling apparatus and mold set-out table

erated during melting of the various alloys from entering the foundry department, the furnaces are under a hood attached to an exhaust system.

Since the furnaces are of different heights, the tops of the pit type being at floor level and tops of the tilting and stationary furnaces being about 4 ft above floor level, the hooding (Fig. 5) is arranged to take care of that situation. Pit type furnaces are enclosed entirely with sheet-metal hoods about 3 ft high which terminate in 12 x 12-in. pipes extending up into a collector duct across all the furnaces. The hoods on the pit type units are straight at the back, but the fronts slope back at an angle of about 60°. Two hinged doors on front and on back swinging outward permit charging and removing the crucible. Sloping front of the hood allows crucible to be placed in and removed from the furnace without interference. Tilting type and stationary furnaces on the sides of the pit units are under canopy type hoods which also are connected to the collector duct.

A craneway with an 18-ft span is located approximately in the center of the foundry and extends from one end of the molding department to the other. It is used mainly in transporting molten metal from the furnaces to the pouring stations located at the various molding units.

As may be observed from the floor arrangement of the foundry, as shown in Fig. 1, molds are made at nine machine and two bench units. Machine molding units differ from those usually seen in that instead of the molds being set out on the floor or on racks, they are placed on manually operated turntables. Turntables are made of two structural steel rings 18 in. apart attached to and supported by radial arms and rods mounted on a central pedestal. Rings are

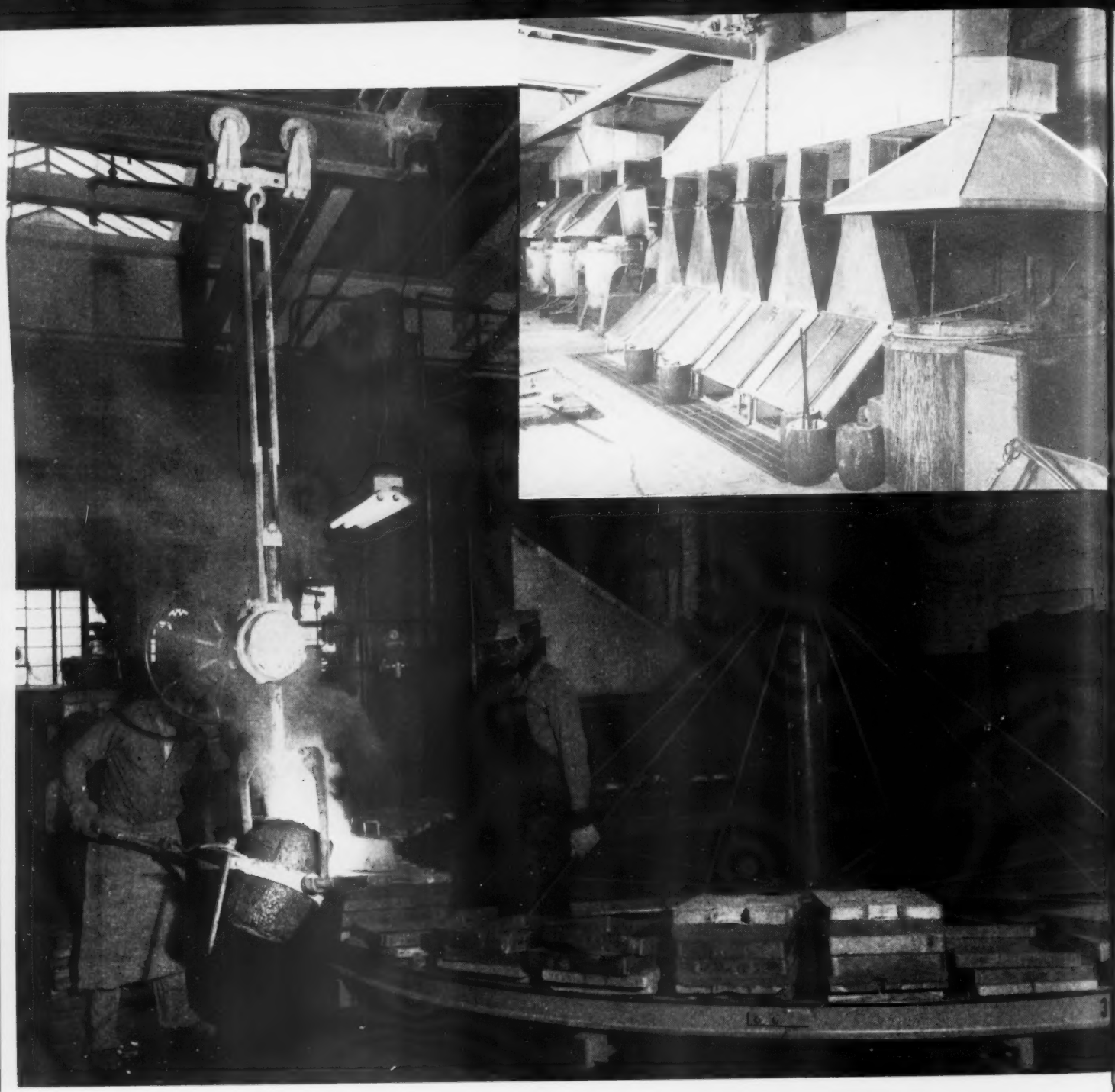


Fig. 3—Pouring crew consists of pourer and two helpers who rotate molds and shift weights. Helpers also shake out molds and recondition the sand

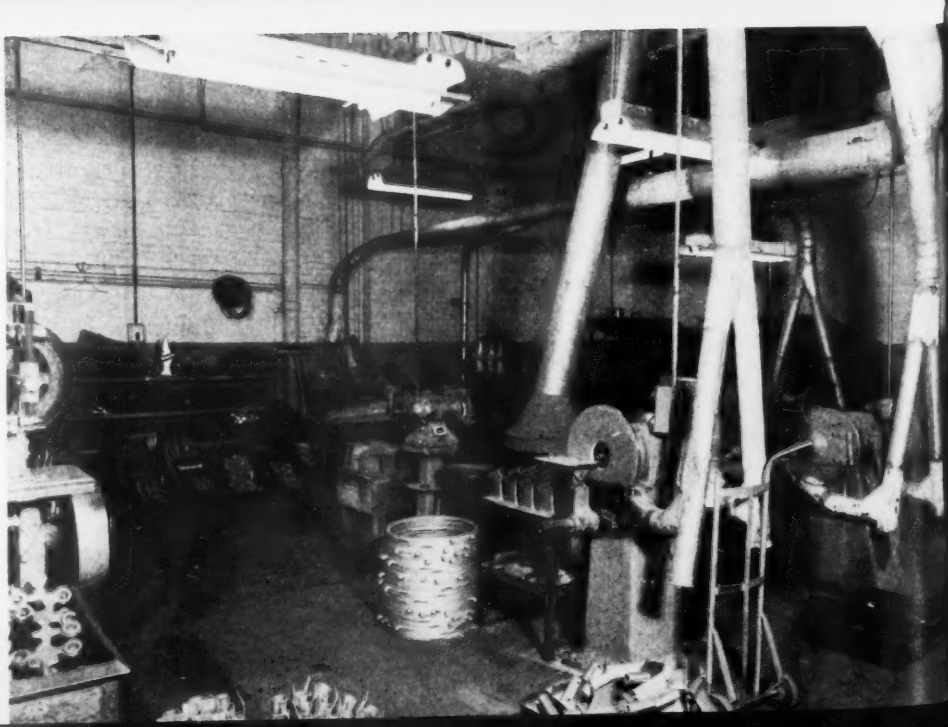
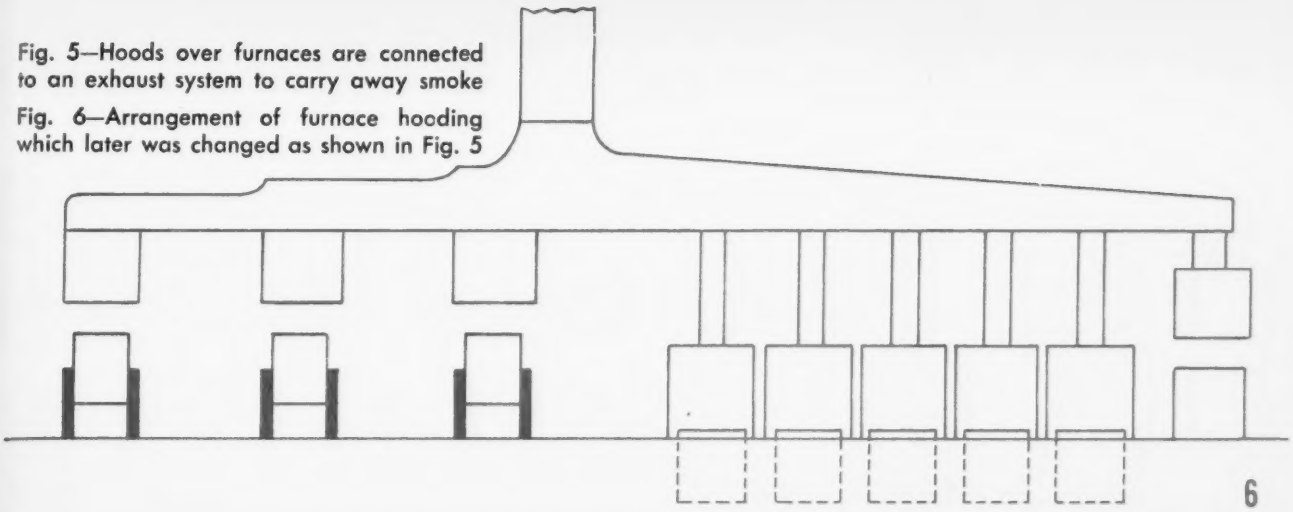


Fig. 4 — After abrasive blasting castings are removed from gates and stubs ground off on various types of grinding machines

Fig. 5—Hoods over furnaces are connected to an exhaust system to carry away smoke

Fig. 6—Arrangement of furnace hooding which later was changed as shown in Fig. 5



about 18 in. above the floor level. Two sizes of turntables are used. The three small tables are 12 ft in diam and hold 26 molds while the six large tables are 16 ft in diam and hold 36 molds. However, unless there is some delay in the melting schedule, the tables seldom are filled with molds. As a general rule by the time the molder sets out eight or ten molds, metal is available and the molds are poured off by a separate crew.

At the three small turntable units molds are shaken out on the floor. Castings are placed in wheelbarrows and taken to the cleaning department. Snap flask bands and bottom boards are placed back on the turntables and pushed around within easy reach of the molder. The sand is tempered and run through a gyratory riddle onto the pile of heap sand at the molding station. Operations at the two bench molding units are similar.

A different procedure is employed with the six large molding machine units. As may be observed in Fig. 1, sand handling units are interposed between each pair of turntables. These units comprise a combination of a shakeout, sand aerator, sand storage bin, sand elevator, and a twin hopper for distributing sand to two molding machines. Roughly the sand unit is about 20 ft long and 6 ft wide. The shakeout, which is the vibrating-grate type, is about 20 x 30 in., and is mounted about 2 ft above the floor level. Sand from the grating drops onto a rapidly moving belt about 7 ft long mounted at an angle of 30° which sprays it into a storage bin with a vee-bottom. Aerated sand is elevated by bucket elevator to a deflector plate which can be adjusted to discharge the sand into either compartment of the twin hopper above the two molding stations.

In operation the molder places the molds on the turntable, and when about eight or ten are set out, the pouring crew places the weights in position and fills the molds. After a suitable period for solidification of the metal, the turntable is rotated until one of the molds is adjacent to the shakeout. Two men lift the mold from the turntable and dump it onto the vibrating grate of the shakeout. As soon as the bands are free from sand, they are removed and placed on the turntable. When the castings are freed from sand, they are picked up and set on a long belt conveyor just back of the shakeout, and carried to the cleaning department.

Method of handling castings in the cleaning room differs from general practice in that previous to cutting off gates and risers, the castings are abrasive blasted using shot in one of three units available for that purpose, including a cabinet type, a rotary table, and a tumbling type unit. Particular type of unit employed will depend on the size and shape of the casting, but majority of castings are cleaned in the tumbling type machine. To eliminate extra handling of the castings, the castings' conveyor belt, as may be seen in Fig. 1, ends close by the blast units.

After the castings have been abrasive blasted they are placed in tote boxes and moved across the aisle to the sawing and grinding department where gates and risers are removed by band saws, sprue cutter, or on an abrasive-wheel (*Please turn to page* 172)

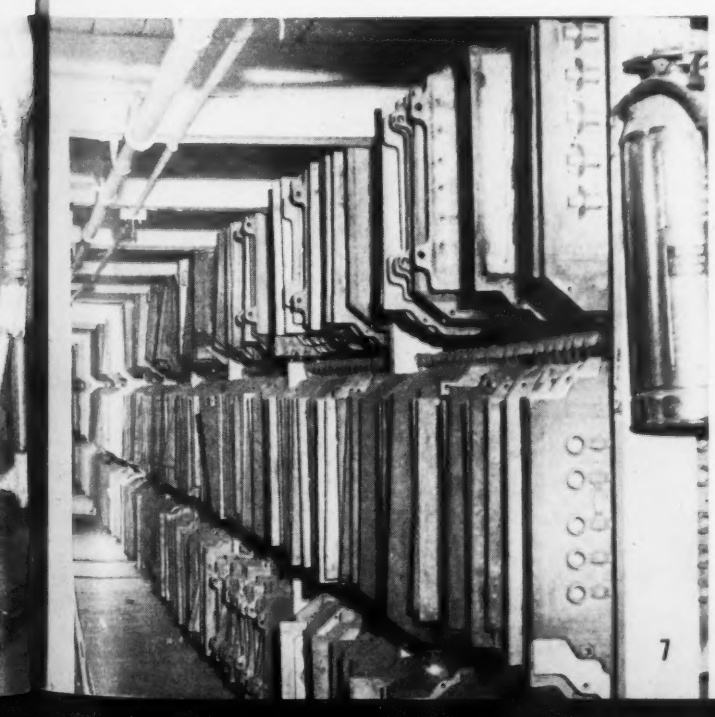


Fig. 7—Pattern storage department on a mezzanine in foundry. Plates hung on hooks; others on shelves

MODERN TRENDS IN

Molding Machines and Core Blowers

By GEORGE E. MILLER
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SINCE World War II rapid strides have been made in both the use and design of molding machines and core blowers. Today, with rising labor costs, foundrymen are primarily interested in purchasing increased productivity per man-hour, and modern machinery and equipment play an important part in attaining this goal.

Production foundries are looking for high-speed, single-purpose automatic machinery, and the semi-production or jobbing foundries want faster machinery to replace their present equipment or the old-time skilled molder who is rapidly going out of existence.

Fig. 1—Core blowing machine equipped with automatic controls. Corebox can be rolled in and out of machine on roller frame mounted on the table. Locator on side of table insures that box is in correct position before machine can be operated

Before considering some of the current trends in design of molding machines and core blowers, it is important to review some of the changes that have taken place in foundries in recent years. These steps of progression have had a major influence on the types of mechanical molding equipment being designed and manufactured today.

Today, the majority of foundries have better sand preparation, sand control and sand handling facilities than they did ten years ago. Consequently, higher quality and more uniform sands are available; this permits a broader application for the machine method of molding.

Foundry management, due to the increased amount of mechanical equipment already in their plants and their dependency on it for profitable operations, now recognize the importance of a competent and adequately equipped maintenance department. With preventive maintenance and regular lubrication, foundries can now keep complex, high-speed machinery in daily running condition. Many production foundries are able to make major repairs and overhaul machinery equally as well as the original equipment manufacturer.

Foundries have made great strides in adopting modern accounting systems that give them an accurate picture of the cost of their various departments and operations. They are interested not only in overall expense but also in the individual job costs and the elements making up that cost. Frequently, accounting records point out the expensive and slower operations, and are important tools in evaluating the need for, and justifying the purchase of, additional mechanical equipment.

One progressive jobbing steel foundry installed three core blowers—one of each size to cover its range of work. A recent analysis of machine records showed each machine was used only 12 to 15 hours per week; however, the works manager felt the machines were a profitable investment. Since installing these core blowers the company has four fewer coremakers in the coreroom, yet is producing more cores of a higher quality, and at a lower cost, than previously. Some foundrymen claim that at the present cost of labor, three 8-hour day's production per week will justify the purchase of an average priced molding machine or core blowers.

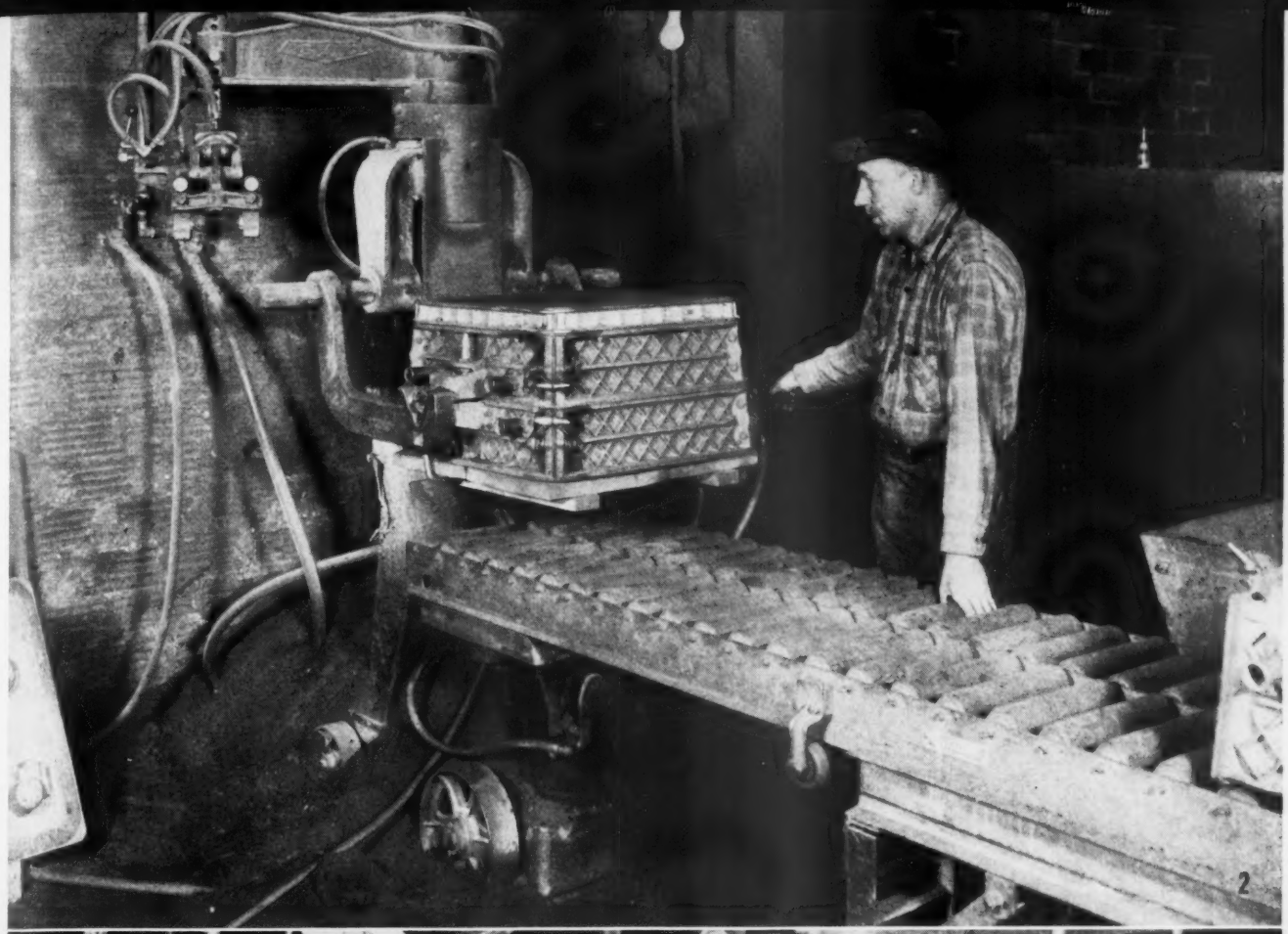


Fig. 2—Machine which mechanically lifts and handles mold during rollover, pattern drawing and mold closing. Telescopic roller conveyor removes mold from the machine

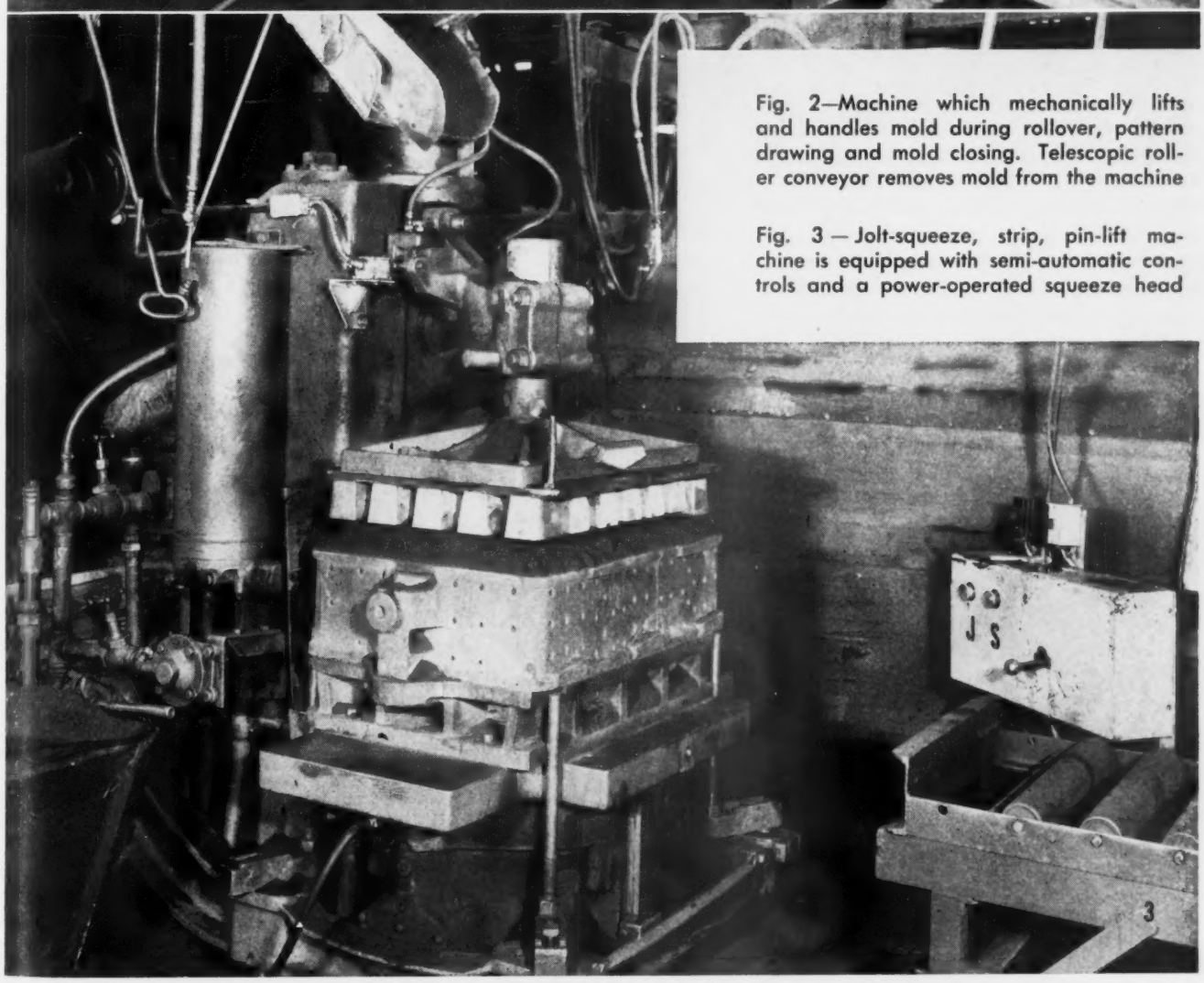


Fig. 3 — Jolt-squeeze, strip, pin-lift machine is equipped with semi-automatic controls and a power-operated squeeze head

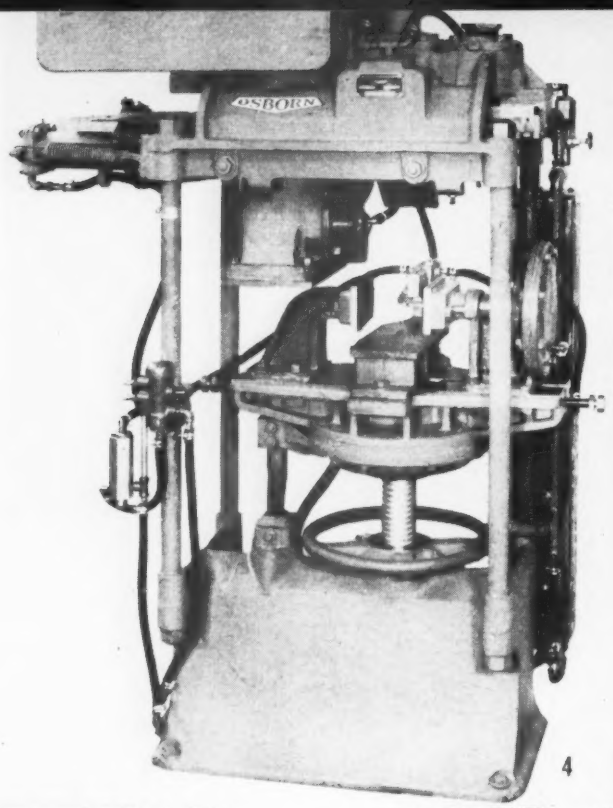


Fig. 4—Operating cycle of this core blower is initiated by the corebox which, when between the jaws, actuates the manual valve on back end of the stool. At end of cycle ejector mechanism (Fig. 5) automatically pushes corebox from between jaws for convenient handling by operator

Improved designs and quality of patterns and coreboxes also have played a part in the current trend toward greater use of molding machines and core blowers. More patterns and coreboxes suitable for machine molding exist today than at any other time in the history of the foundry industry. The increased number of foundry engineers employed by the industry likewise has aided machinery manufacturers in developing more efficient molding methods and equipment.

The three principal objectives or trends in the engineering and designing of modern molding machines and core blowers are:

1. To reduce the foundries' dependency on the individual skill of the molder for both quality and quantity of production.
2. To reduce the physical effort required of the molder by incorporating handling or conveying equipment into the design of the machine.
3. To increase productivity per man-hour with the assistance and use of automatic controls.

In recent years use of the squeeze type molding machine by both jobbing and production foundries

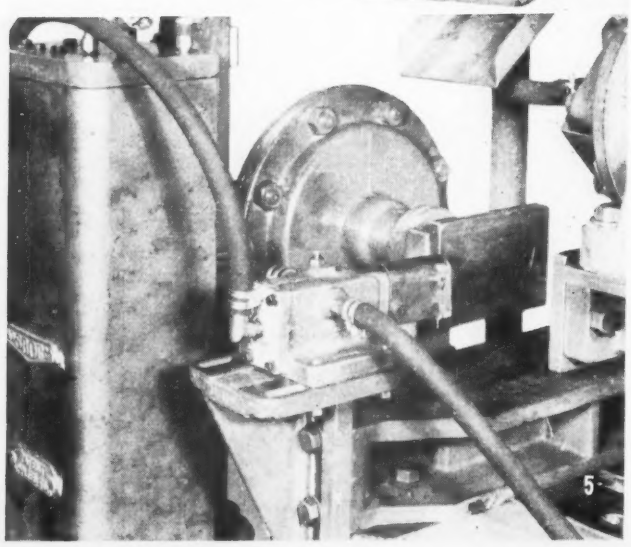
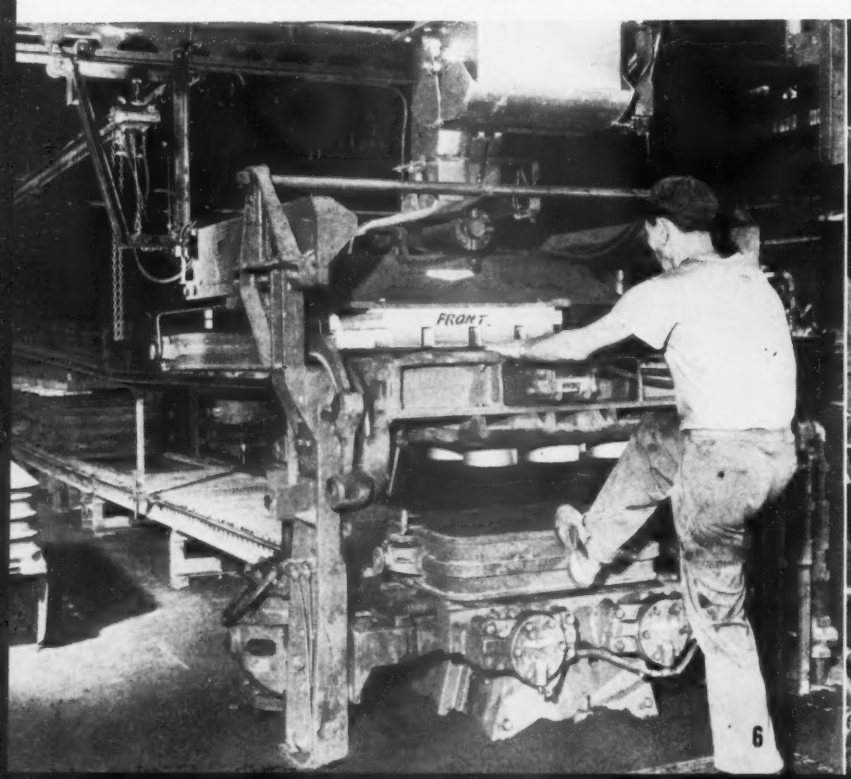
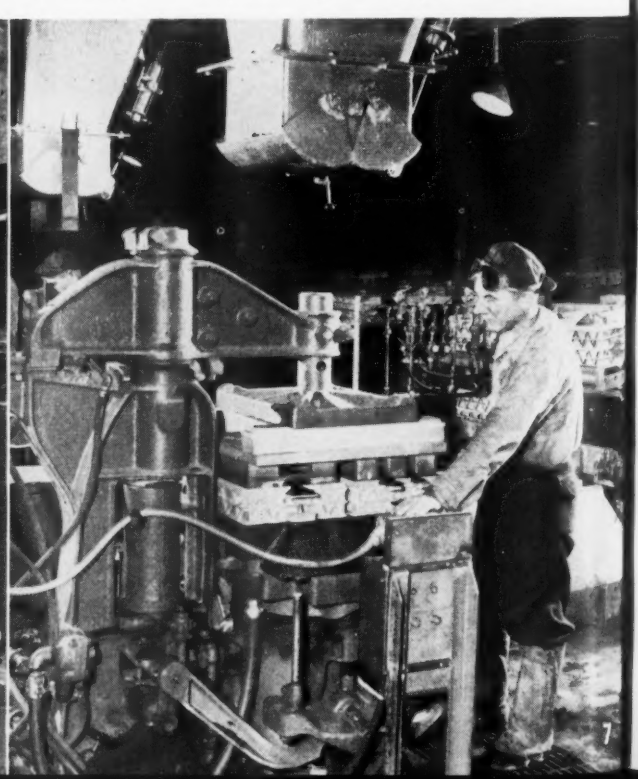


Fig. 6—Jolt-squeeze, rollover, pattern draw molding machine with a power-operated squeeze head and manual controls. Roller conveyor for removing finished mold is built into machine

Fig. 7—Post type, automatic, jolt-squeeze, strip, pin-lift machine for making cope and drag simultaneously. It has a power-operated squeeze head





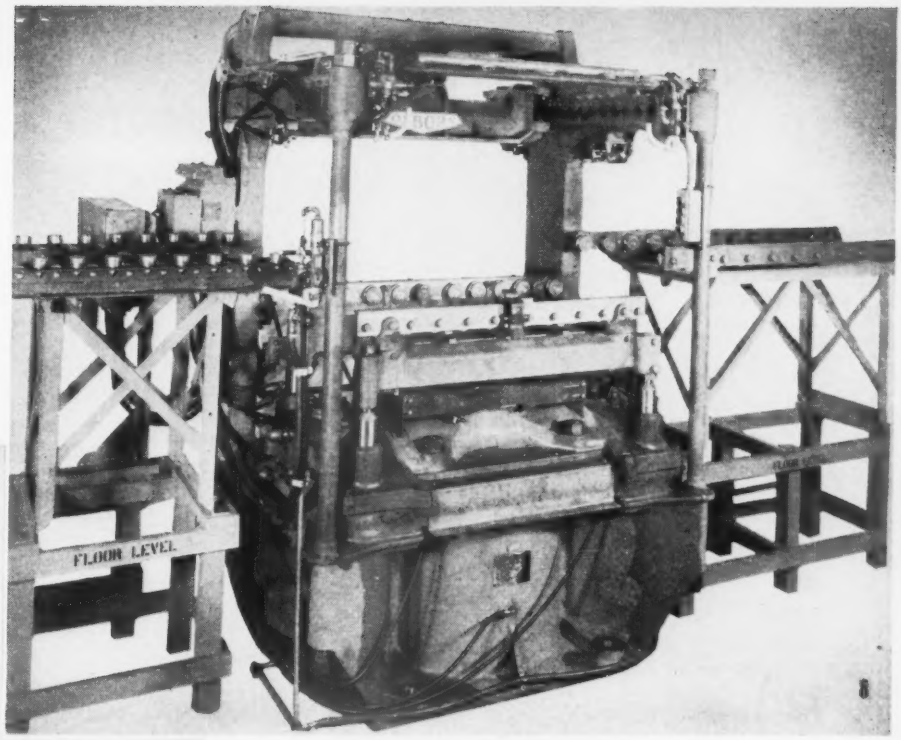
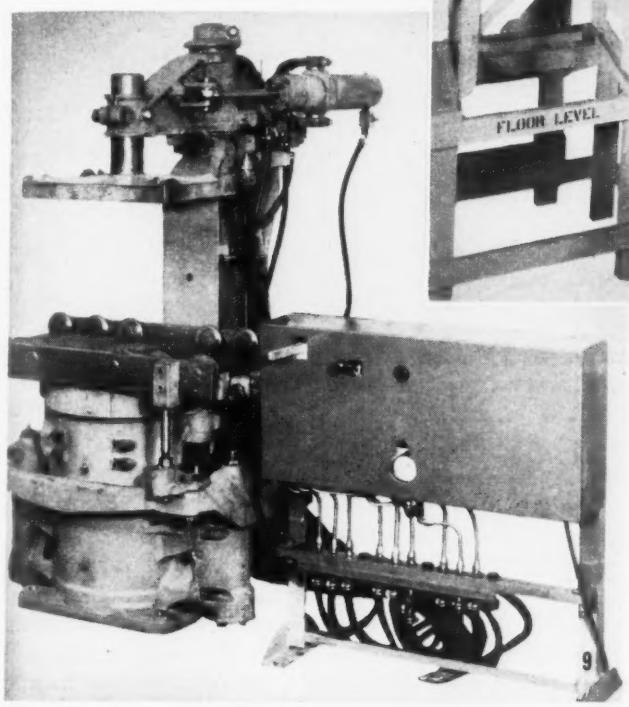


Fig. 8—Jolt-squeeze, strip machine equipped with both manual and semi-automatic controls and roller conveyors for roll-on and roll-off, as well as a flask locator. Automatic cycle can be adjusted for manual interruption if desired. Stripped mold is transferred to rollers for removal from machine

Fig. 9—This post type, jolt-squeeze, strip machine is equipped with a power-operated squeeze head, automatic controls and a side roll-on and roll-off feature. All of the automatic controls are mounted on a separate panel



has increased. The squeeze eliminates or greatly reduces both the time and effort required for butting off the molds after jolt ramming. Not only is the squeeze faster, but it reduces dependency on the molder's skill for uniformity of ram and overall hardness of molds.

With improved sands, patterns and flask equipment, foundries today are squeezing molds harder than they thought practical years ago. This has led to wider use of machines capable of developing greater squeeze pressures. An increasing number of intricate drags are being made on jolt-squeeze-stripper machines and rolled over by hand or on a hoist bail during the set-out. This is faster than a rollover machine for patterns which can be stripped. For patterns which cannot be stripped, jolt-rollover-squeeze pattern draw type machines are available.

When selecting a squeeze type machine more consideration should be given to the area of molds to be made and the diameter of the squeeze piston in the machine rather than to the size of the jolt table. A tendency in recent years has been for machine jolt tables to become smaller compared with the squeeze piston diameters. Larger diameter and faster travel of squeeze pistons have led to heavier and more rugged machines to withstand the higher squeeze pressures developed for use in modern molding machines.

Machine design engineers now give more consideration to the motions required by the operator of a given machine and the individual time needed for each motion. For maximum efficiency the valves and controls should be positioned to eliminate unnecessary movements of the operator. Often an individual study is made of proposed installations, analyzing the location of the servicing and handling equipment to be used in conjunction with the machine, before final positioning of the operating valves. Today we are building more left-handed or specially arranged control machines than ever before.

Flask, mold, and corebox handling facilities and equipment are being incorporated in many types of new machines in order to reduce the physical work required of the operator. Conveyors for rolling flasks and coreboxes to or from machines have had wide acceptance by foundries in recent years due to the rising cost of foundry labor.

Along with this has come the development of mechanical methods for locating this equipment on machine tables. Mechanisms have also been developed to mechanically feed empty flasks and coreboxes to machines as well as remove rammed molds. The valves for these mechanisms are usually interlocking with the machine control system to provide safety for both the operator and the flask or corebox.

Some specialized single-purpose machinery is available which mechanically sets cores and closes molds. These may be classed as separate handling machines used in conjunction with (*Please turn to page* 215)

Experimental Production of Nodular Gr

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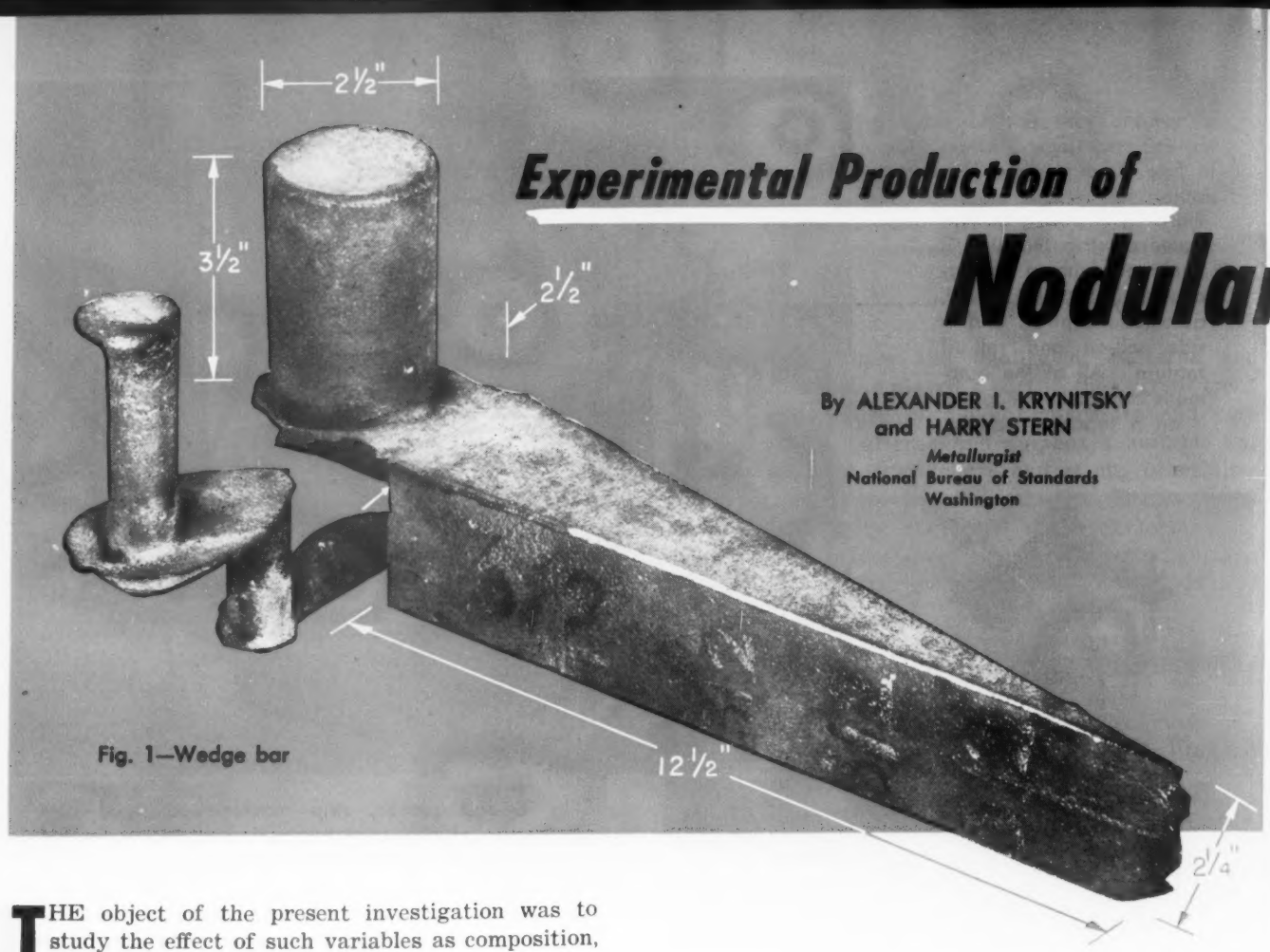


Fig. 1—Wedge bar

THE object of the present investigation was to study the effect of such variables as composition, melting and pouring temperatures, nucleation technique, and cooling rate and of such addition agents as magnesium, magnesia, magnesite, iron sulphide, calcium, nickel-chromium-molybdenum and boron on the formation of nodular graphite in cast iron.

This investigation was started shortly after an announcement was made by Wickenden[1] that a method of producing nodular iron by treating the molten metal with a small addition of magnesium had been developed by the International Nickel Co. Later two patents were granted and assigned to that company[2].

As far as the authors are aware the only previous evidence that a nodular graphite structure may be produced by treating molten cast iron with magnesium is found in a report by Von Keil and co-workers[3, 4]. They reported that if a superheated iron-carbon melt is deoxidized with aluminum, manganese or magnesium and then copper-silicon is added, the solidified iron will contain only nodular graphite. A melt containing 3.8 per cent C, 1.16 per cent silicon, and 0.74 per cent manganese, deoxidized with 0.03 per cent of a 90-10 aluminum-magnesium alloy, froze with graphite needles, but when 0.06 per cent of the same deoxidizer was used only nodular graphite was formed. This quantity of deoxidizer corresponds to only 0.006 per cent of magnesium, and in light of present knowledge of the amount of magnesium required to effect nodulization there is a doubt that the graphite aggregates observed by Von Keil were true nodules.

When the present investigation was started the cerium process for producing nodular graphite in cast iron had already been described in detail by Morrogh and his co-workers[5, 6, 7] whereas there was a dearth of information on the details of the magnesium process. Hence, the initial work in this investigation was on the use of magnesium.

The results obtained from our early experiments were in agreement with the published information which began to appear at that time. The information accumulated since then can be judged from the bibliographies published by Ziegler, Meinhart, and Goldsmith[8], and by Morral[9].

Basic Irons, Casting Procedure, and Specimens—Chemical analyses of the pig irons used in this study are given in Table I.

The melting unit was a 200-lb capacity high-frequency induction lift-coil furnace. Crucibles made of magnesia, clay-graphite, and clay-graphite lined with sillimanite or silica wash, were employed. The silica wash consisted of 80 per cent silica flour with 4 per cent western bentonite plus water. The metal charge in different heats varied from about 15 to about 80 pounds. The temperature of the molten metal was measured by means of an optical pyrometer, or a platinum vs. platinum—10 per cent rhodium thermocouple protected by a glazed porcelain tube contained in a closed-end graphite tube. The portion of the graphite tube in contact with the molten metal was protected by a coating of aluminum-oxide cement covered with a mixture containing 95 per cent of zirconium silicate and 5 per cent of western bentonite.

As a rule, after melting and bringing to maximum temperature, the metal was stirred and skimmed and the requisite addition made. The metal was then

Graphite in Cast Iron

skimmed again, inoculated with 0.4 per cent silicon added in the form of 50-50 ferrosilicon, and poured. In some cases silicon was added in the form of 30-70 calcium-silicon. Some heats were made in which larger or smaller amounts than 0.4 per cent silicon was used for inoculation. A few were made without inoculation.

Routine metallographic examinations and brinell hardness determinations were made on the cross sections of sand cast bars (1.2-in. diameter, either 6 or 21 in. long). Chemical analyses also were made on samples milled from the cross section of these bars, whereas the spectrochemical analyses were made on the cross sections of chill-cast bars (1.2-in. diameter x 6 in.). The microstructure of the entire section of the bar was examined and the most characteristic areas were photographed. The brinell hardness numbers represent the average values for two determinations, one made at the center and the other midway between the center and the periphery.

The effect of cooling rate (section size) on the microstructure of the iron was determined with wedge bars (Fig. 1), and with shot formed by pouring molten iron into water. The relative cooling rates on the wedge bars were measured by means of chromel-alumel thermocouples placed at intervals in the mold cavity. Usually, six couples were used, starting about ½-in. from the apex and spaced about 1 in. apart

ABSTRACT

This is the first of two articles describing a study of the effect of treatment with magnesium, magnesia, magnesite, iron sulphide, calcium, nickel-chromium-molybdenum and boron on the graphite structure of cast iron. Completely nodular graphite was produced only in iron containing more than 0.03 per cent Mg. Two types of nodules were observed—radial and structureless. Rapid cooling facilitated nodule formation but the effect of cooling rate decreased with increase in magnesium content. No relation between nodule formation and pouring temperature or maximum heating temperature was observed. This study supports the belief that nodular graphite is formed in the melt during solidification, and graphite patches are produced after solidification by decomposition of carbides

TABLE I—Chemical Composition of the Pig Irons Used as Melting Stock

Iron Designation	Total C %	Si %	Mn %	P %	S %	Ti %	B %
E	3.94	1.55	0.60	0.05	0.026	0.063	0.002
I	3.84	1.21	0.51	0.15	0.013	0.003	0.008
K	3.77	2.18	0.063	0.78	0.031	0.10	0.002
P	3.44	1.22	0.18	0.079	0.020	0.030	....
Q	3.52	2.11	0.41	0.15	0.013	0.030	0.007
481	3.47	1.93	0.50	0.18	0.042	0.023	0.147
Wash Metal	3.38	0.26	0.20	...	....	...	....

TABLE II—Heats Made in Clay-graphite Crucibles Coated with Sillimanite and Treated with Magnesium Added as 80 Cu—20 Mg Alloy

Heat No.	Iron Designation	Mg Added %	Chemical Composition (% by Weight) C	Si	Mn	P	S	Mg	Cu	Carbon Equivalent*	1.2-in. Diam Sand-cast Bar Bhn	Structure
231	E	0.25	3.38	2.52	0.54	0.030	0.019	0.034	1.3	4.14	207	Mostly flake graphite, some nodules in ferrite rings. Matrix: pearlite, some free ferrite.
226	I	.30	3.32	3.10	.48	.15	.010	.045	..	4.30	229	Mostly flake graphite, some nodules in ferrite rings. Matrix: pearlite and free ferrite.
232	E	.30	3.48	2.43	.51	.026	.016	.055	1.0	4.22	223	Mostly flake graphite, a few nodules in ferrite rings. Matrix: pearlite and some free ferrite.
229	E	.50	3.55	2.40	.53	.034	.010	.057	1.1	4.28	242	Mostly nodular in peripheral zone, flaky at center. Nodules in ferrite rings. Matrix: pearlite with free ferrite.
235	E	.50	3.27	2.38	.52	.028	.016	.086	.8	3.99	282	Regular — and irregular — shaped nodules, some in ferrite rings, most in pearlite. Many short thick flakes. Matrix: pearlite and free cementite.
234	E	.45	3.52	2.37	.53	.028	.015	.090	1.1	4.24	259	Regular — and irregular — shaped nodules, most in ferrite rings, some in pearlite. Many graphite flakes. Pearlite matrix.
233	E	.50	3.47	2.30	.52	.025	.014	.096	1.2	4.17	293	Regular — and irregular — shaped nodules in pearlite, many flakes. Matrix: Pearlite and free cementite.
230	E	1.00	3.47	2.55	.53	.030	.012	.10	1.5	4.24	439	Nearly 100% nodular. Nodules irregularly shaped, in pearlite. Matrix: pearlite and free cementite.

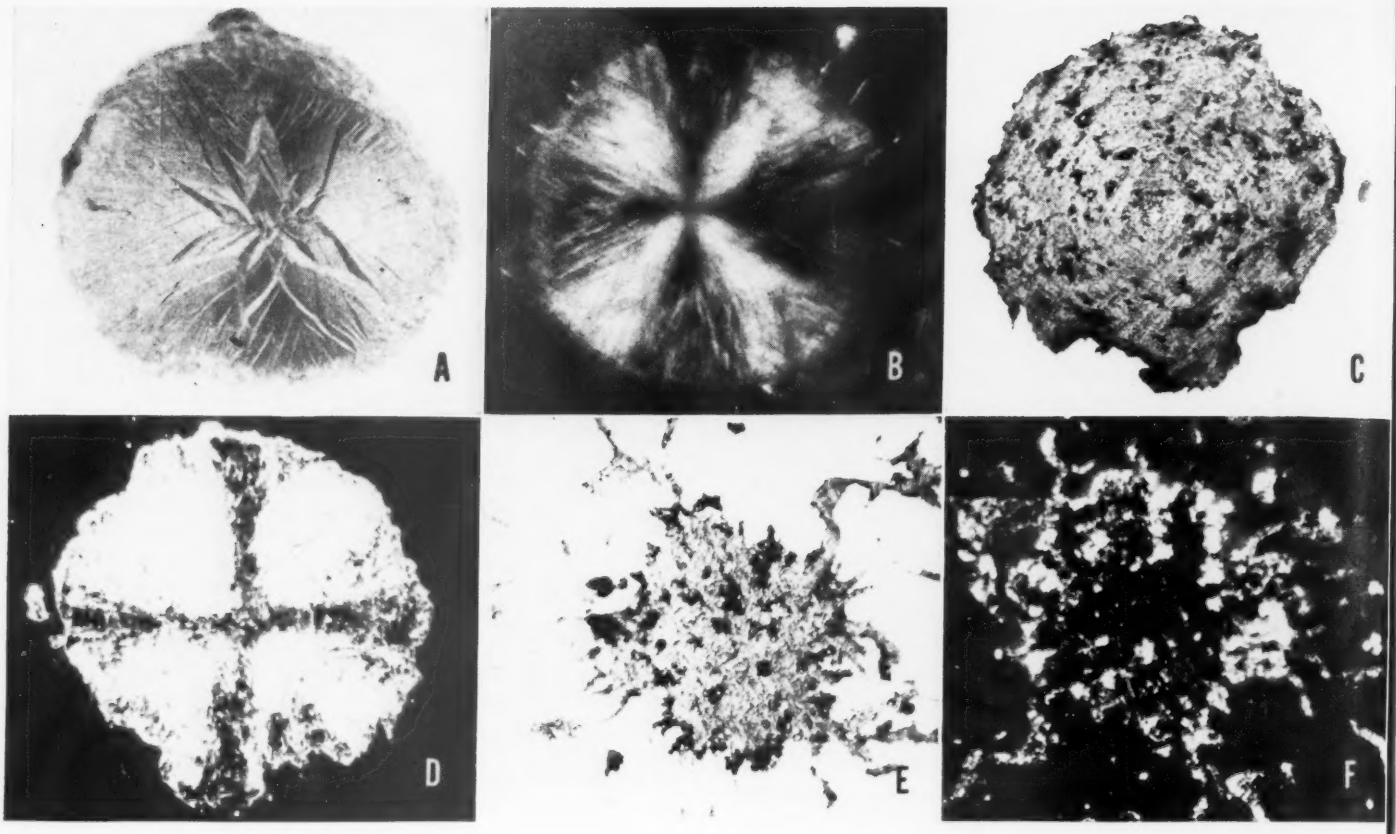


Fig. 2—Graphite nodules and patches. Unetched, X500. A, C, E—under ordinary light. B, D, F—under polarized light

Fig. 3—Some forms of graphite observed in various irons. Unetched. A—Malleable iron, ordinary light, X 500. B—Same as A, polarized light. C, D—Cores in nodules observed in sand-cast bars of Heats 308 and 237, X 1500. E—Graphite structure at the tip of a wedge bar containing 0.023 per cent Mg (Heat 227), X 500. F—Same as E, except 8 in. from tip.

along the median line of the wedge. Temperatures were recorded on a Brown Electronik six-point high speed potentiometer.

The observed average time of cooling from the pouring temperature (1340°C) until the temperature reached 970°C was:

1½ inches from tip	=	¾ minute
2½ inches from tip	=	2 minutes
4½ inches from tip	=	4½ minutes
6½ inches from tip	=	10 minutes
9½ inches from tip	=	16 minutes

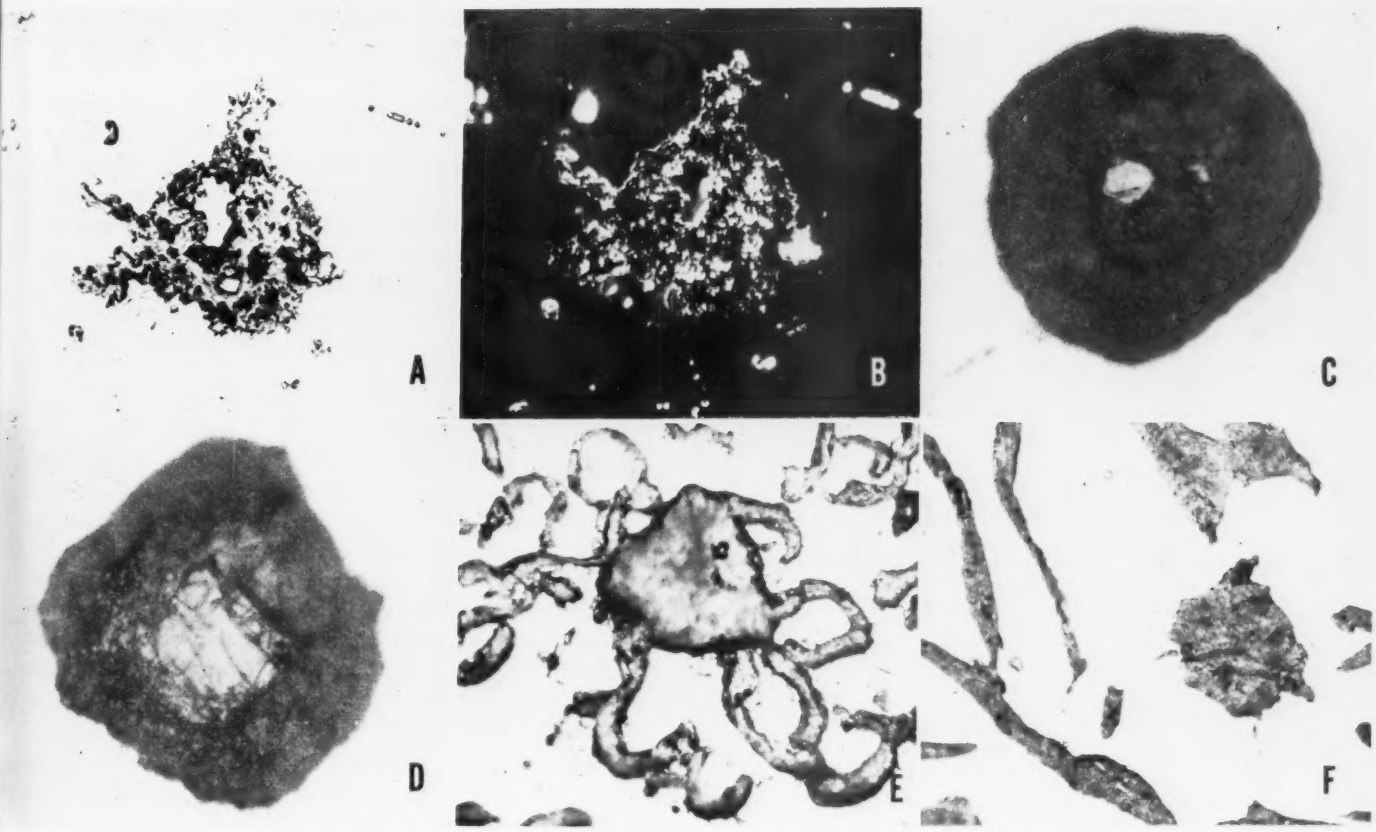
The transverse strength properties of some nodular irons were determined on 1.2-in. diameter cast cylindrical bars over an 18-in. span. Although various molding techniques were used to prevent shrinkage cavities along the longitudinal axes of the bars, complete elimination of unsoundness was not achieved. Therefore, to complement the transverse tests a few tensile tests were made on standard 0.505-in. diameter specimens machined from cast keel blocks.

Experimental Results—The major effect of magnesium on the structure of cast iron is, of course, to produce graphite in the form of nodules instead of flakes. The nodules may be classified into two types on the basis of appearance. The first is the radial type, illustrated in Fig. 2A, in which the nodules show star-like figures or radial lines; the second type is structureless, showing no radial lines or internal figures, as illustrated in Fig. 2C. Fig. 2, B and D, shows nodules of the radial and structureless types, respectively, under polarized light. The pattern appearing in Figs. 2 B and D is characteristic and is formed by both types of nodules. It is probable that the difference in appearance of the two types is due only to a polishing effect. However, both forms have been seen adjacent to each other in the same metallographic specimen.

Sometimes the graphite in the cast iron may form in a mass or aggregate as shown in Fig. 2E. Although resembling a nodule it does not show the distinctive pattern of regular nodules under polarized light, Fig. 2F. As this form of graphite has no definite pattern when viewed under polarized light it is described as an aggregate or patch. The appearance of these patches is similar to that of temper carbon nodules in malleable iron either under ordinary light (Fig. 3A) or polarized light (Fig. 3B).

The structureless type of nodule may show an inclusion at its center, Fig. 3C, which is seldom seen in the radial type. Occasionally the contour of a nodule may follow roughly the contour of its core, Fig. 3D. Many cores show black markings resembling cracks and occasionally a core may show polishing scratches running across its surface. These scratches indicate that the cores are definite inclusions and not merely depressions in the surfaces of the nodules.

Thus a cast iron can contain graphite forms rang-



ing from ordinary flake through flake-aggregate to regular nodular structures.

Treatment with Pure Magnesium—In the preliminary work of this investigation commercially pure magnesium was used as the nodulizing agent. Usually, the addition was made by throwing the magnesium onto the surface of the molten iron after the crucible had been removed from the furnace; in a few melts the magnesium was placed in a heated crucible and the molten iron poured over it. Results in these early heats were erratic. It was then believed that the type of crucible employed was responsible, but

TABLE III—Heats Made with Different Maximum Heating and Pouring Temperatures[1]. Heats Treated with Magnesium Added to Molten Metal as 80 Cu—20 Mg Alloy

Heat No.	Iron Designation	Temp, °C		Chemical Composition (% by Weight)							Carbon Equivalent[2]	1.2-in. Diam Sand-cast Bar	
		Max. Heat	Pouring	C	Si	Mn	P	S	Mg	Cu		Bhn	Structure
237	E	1700	1340	2.78	2.92	0.54	0.026	0.017	0.050	1.9	3.66	253	Nodular, nodules in ferrite rings. Matrix: pearlite.
238	E	1650	1340	3.49	2.93	.54	.022	.011	.073	1.8	4.38	248	Ditto
239	E	1600	1340	3.96	2.78	.53	.024	.012	.072	1.8	4.80	266	Ditto
243–1[3]	E	1600	1340	3.51	2.56	.53	.03	.024	....	..	4.29	131	Flakes
243–3	E	1600	1340	4.25	2.85	.54	.025	.012	.059	..	5.11	249	Nodular, nodules in ferrite rings. Matrix: pearlite.
240	E	1550	1340	3.36	2.40	.51	.023	.009	.094	1.8	4.09	269	Nodular, nodules in ferrite rings. Matrix: pearlite.
241	E	1500	1340	3.34	2.74	.55	.026	.014	.098	1.6	4.17	252	Nodular, most nodules in ferrite rings, some in pearlite. Matrix: pearlite.
242	E	1450	1340	4.48	2.76	.53	.025	.015	.078	.75	5.32	229	Nodular, nodules in ferrite rings. Matrix: pearlite and ferrite in equal amounts.
275	I	1500	1340	3.78	2.39	.49	.15	.008	.06	1.00	4.54	262	Nodular, most nodules in ferrite rings, some in pearlite. Matrix: pearlite.
276–1	I	1500	1320	3.79	2.48	.48	.15	.01	.058	.98	4.58	283	Nodular, nodules in ferrite rings.
276–3	I	1500	1370	...	...	...	....	....	.044	..	...	250	Matrix: pearlite with some free cementite.
277–3	I	1500	1320	3.82	2.43	.47	.14	.009	.050	.78	4.59	302	Nodular, nodules in pearlite, many irregular shape, radial or compact type. Matrix: pearlite.
277–1	I	1500	1310	...	...	...	....	....	....	..	...	290	
278	I	1500	1360	3.73	2.45	.47	.15	.01	.073	1.40	4.51	350	Nodular, nodules in pearlite, many of irregular shape. Matrix: pearlite, with much free cementite, no free ferrite.
279	I	1500	1360	3.77	2.42	.46	.15	.009	.094	1.50	4.54	370	Nodular, nodules in pearlite. Matrix: free cementite with some pearlite. No free ferrite.

1. Heats 237 to 243 inclusive were made in clay-graphite crucibles coated with silica wash. Heats 275 to 279 inclusive were made in uncoated clay-graphite crucibles.
2. Carbon equivalent was calculated by formula: %C + 0.3 (% Si + % P).
3. Bar 243-1 cast prior to magnesium treatment, bar 243-3 cast after magnesium treatment. Compare properties in Table IV.

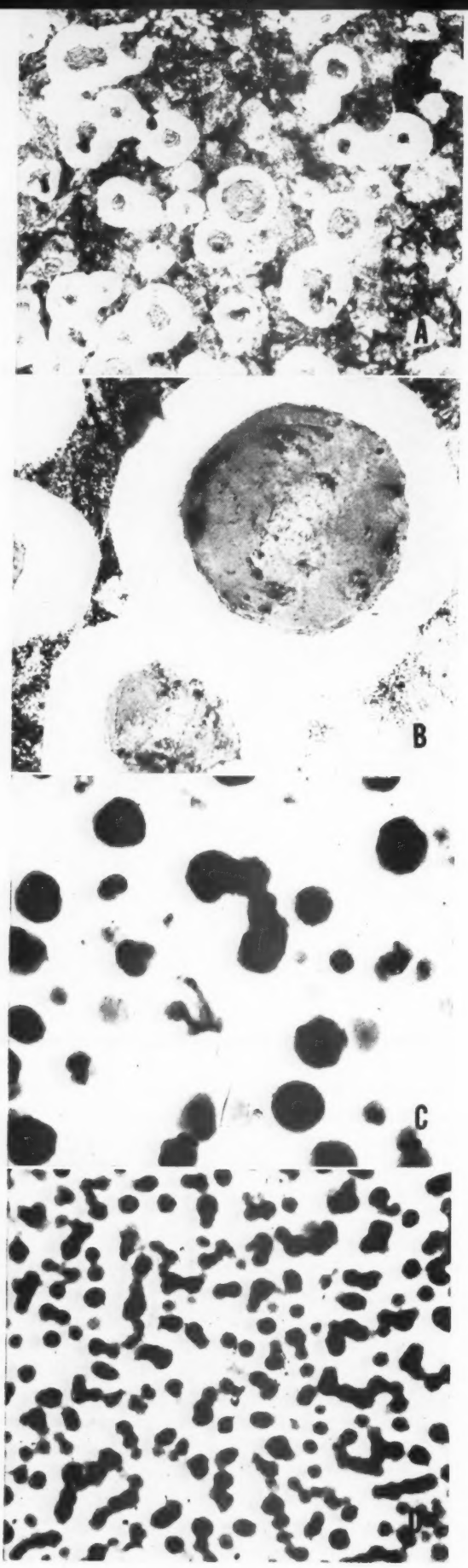


Fig. 4—Typical photomicrographs and microradiographs of nodular irons. A—Photomicrograph. Specimen etched with 1 per cent nital, X 100. B—Same as A, X 500. C—Microradiograph, sand-cast bar from Heat 238. X 100. D—Microradiograph, chill-cast bar from Heat 238, X 100

later work (with a copper-magnesium alloy) led to the conclusion that the crucible or its lining has practically no effect on nodule formation.

The violence of the reaction between pure magnesium and molten iron, with its consequent heavy spattering of metal and high loss of magnesium due to burning, made close control of these early melts difficult to attain. This may explain, at least in part, the variations obtained in the graphite structure. Although graphite nodules were formed in these early heats, there was poor correlation between magnesium added, magnesium retained, amount of nodules formed, and brinell hardness.

Variations in the structure of a wedge specimen from a heat made of iron No. 1 treated with pure magnesium and containing 0.023 per cent magnesium are shown in the photomicrographs reproduced in Fig. 3E and F. The tip of this wedge (Fig. 3E) exhibited a graphite structure consisting of globules and relatively thick curved flakes. The same spot examined with polarized light did not show a definite pattern such as is exhibited by regular nodules under polarized light. A section 8 in. from the tip of the same wedge showed a few nodules but mostly normal or straight flakes (Fig. 3F).

Treatment with 80 Cu-20 Mg Alloy—In these heats varying amounts of magnesium were added to the molten iron by throwing the 80 Cu-20 Mg alloy onto the surface of the melt after the crucible had been removed from the furnace and the metal skimmed. A few heats also were made in which the alloy was added by placing it in a preheated crucible and pouring molten metal over it.

The first runs in this series were made in a clay-graphite crucible coated with sillimanite; the data relating to this group are presented in Table II. Approximate maximum heating and pouring temperatures were 1500° and 1340°C, respectively.

In none of the sand cast bars containing less than 0.1 per cent magnesium was the graphite structure 100 per cent nodular. Instead, it consisted of flakes, both types of nodules, and patches of irregular form. The cast bar containing 0.034 per cent magnesium showed very few nodules. It may be mentioned that the structure at the periphery of the bar containing 0.057 per cent of magnesium (heat No. 229) was practically 100 per cent nodular while the central portion of the bar was mostly flake graphite.

This difference in structure is evidently due to different cooling rates in the bar, indicating that faster cooling rates favor nodule formation. In this series of heats, the matrices of the bars containing 0.057 per cent or less magnesium were mostly pearlite with some ferrite around the nodules. The matrices of bars having 0.086, 0.090 and 0.096 per cent magnesium consisted of pearlite, free cementite, and a small amount of ferrite surrounding some of the nodules.

The sand cast bar containing 0.1 per cent magnesium (heat No. 230) possessed nearly a 100 per cent nodular structure. The nodules were compact, smooth, of an irregular shape, and were in pearlite.

Metallographic examination of the wedge blocks of this group revealed that in all these heats (except heat No. 231 containing 0.034 per cent magnesium)

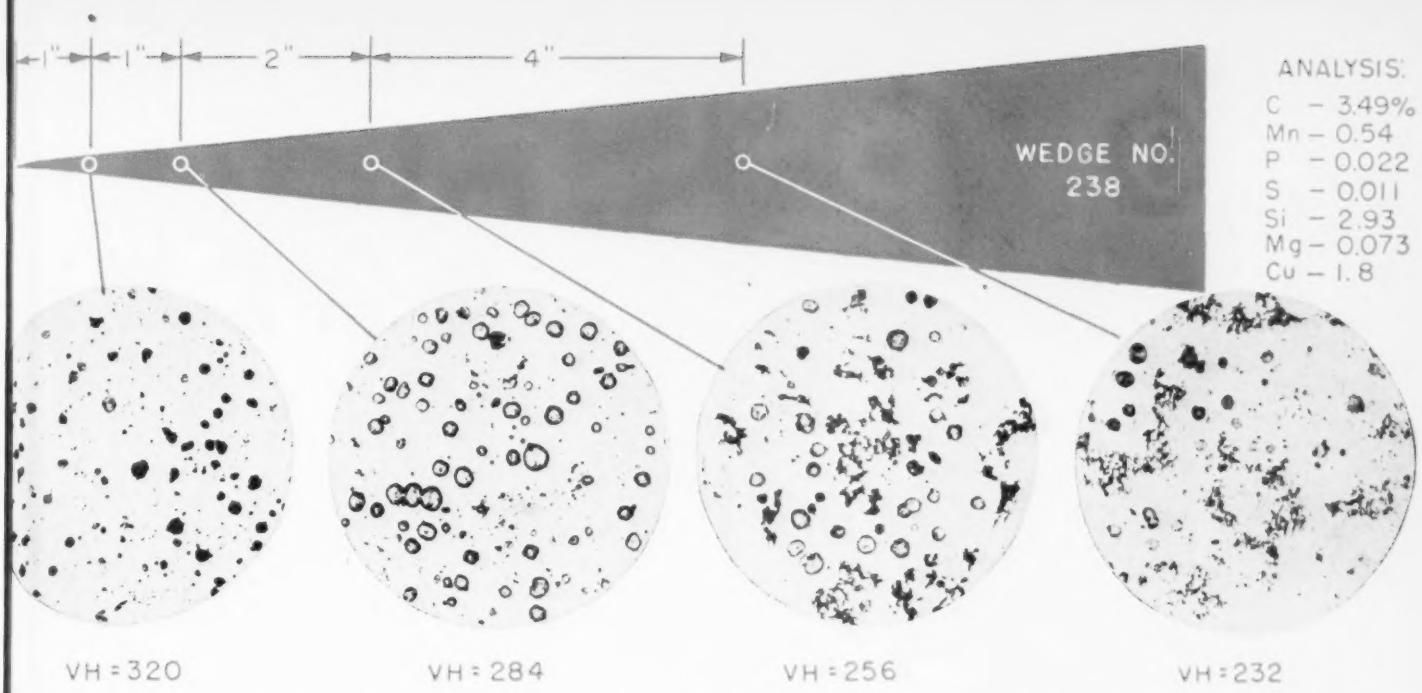


Fig. 5—Variation in type of graphite structure and hardness with section sizes. Microstructures, unetched, X 100. VH = Vickers hardness, (10-kg load)

the graphite structure near the tip was practically 100 per cent nodular. These nodules were round and compact, some of them being smooth and others having a radial structure. In heat No. 226 containing 0.045 per cent magnesium, this compact type of nodule persisted throughout the entire length of the wedge, but in general in the thicker sections (2 in. and more from the tip) the structure was patch graphite with only a few nodules.

The structure of the 1.2-in. sand cast bar from heat 230 (0.10 per cent magnesium) was entirely nodular, whereas only a few nodules were observed in the section 2 in. from the tip of the wedge cast from the same heat. Presumably the cooling rate in each case was approximately the same so there is no obvious explanation of the difference in structure. A similar discrepancy is seen in the presence of a nodular structure throughout the entire length of the wedge block from heat 226, containing 0.045 per cent magnesium, and the absence of that structure from the sand cast bars of that heat and other heats containing less than 0.1 per cent magnesium.

Effect of Maximum Heating Temperature—In the second group of heats treated with magnesium in the form of 80 Cu-20 Mg alloy, the effect of variation in the maximum heating temperature was studied. The data for this group are presented in Table III.

Heats 237 through 243 inclusive were made in a clay-graphite crucible coated with silica wash. The pouring temperature of these heats was 1340°C but the maximum heating temperature varied from 1450° to 1700°C. Although the quantity of magnesium added to each heat was the same, 0.5 per cent, the magnesium and copper contents of the castings of different heats varied from 0.050 to 0.098 per cent and 0.75 to 1.9 per cent, respectively. Brinell hardness numbers ranged from 229 to 269 for the magnesium-treated bars; these heats include irons of the hypoeutectic, eutectic, and hypereutectic types.

The graphite structure of the sand-cast bars was practically 100 per cent nodular and no effect of the maximum heating temperature was noticed. Most nodules were round and compact with smooth surfaces and appeared to be of the structureless type, although some radial type nodules were also present. No cores were detected in the radial type of nodule, confirming the results reported by E. K. Smith[10]. The matrix of these bars consisted of pearlite. Some nodules were in pearlite but most of them were surrounded by ferrite rings. The structure of the sand-cast bars from these heats, shown in Fig. 4, A and B, was typical of ordinary nodular iron.

Microradiographs were made of the chill-cast and sand-cast bars of melt No. 237 in order to observe the distribution of nodules in a three-dimensional section of a casting rather (*Please turn to page* 243)

TABLE IV—Transverse Strength Properties of Magnesium-treated Iron Poured at Different Temperatures

Heat No.	Temperature °C		Rupture, psi	Modulus of: Elasticity EI (S), psi	Deflection, Inches	Mg %
	Max. Heating	Pouring				
275	1500	1340	138,700	24.4×10^6	0.41	0.060
276–1	1500	1320	139,500	29.0×10^6	0.37	0.058
276–3	1500	1370	129,900	27.4×10^6	0.29	0.044
277–1	1500	1310	132,200	25.3×10^6	0.28	0.050
277–3	1500	1320	125,900	23.7×10^6	0.30	0.050
243–1	1600	1350	35,300	5.4×10^6	0.33	Nil[1]
243–3	1600	1350	166,300	21.6×10^6	...[2]	0.059

1. This bar not treated with copper-magnesium alloy. 2. Value omitted because bar did not rupture under load applied in initial test.

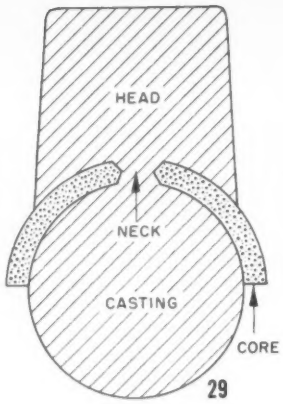
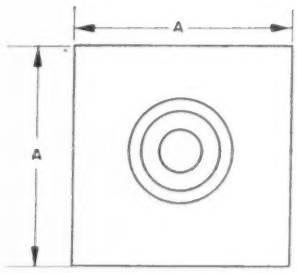


Fig. 29 — Core conforming to shape of the casting reduces cost of burning off head



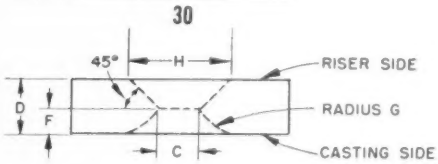


Fig. 30 — Design of refractory cores for Washburn heads. Dimensions given in Table I

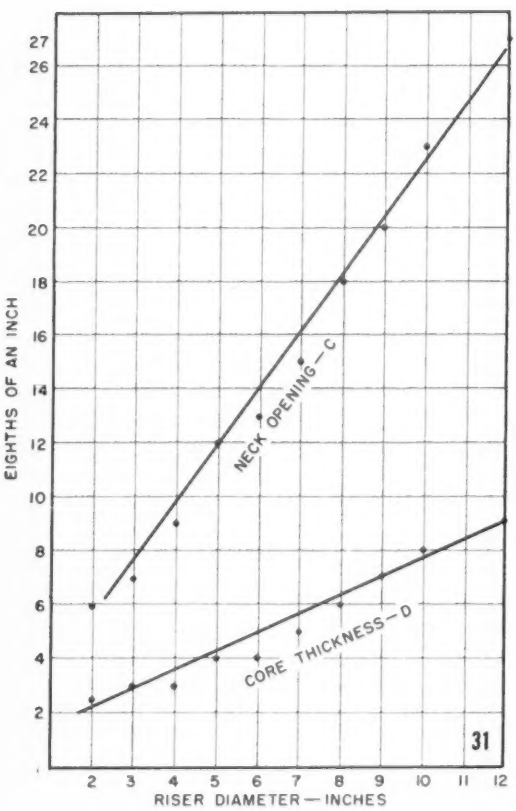


Fig. 31—Curves based on data presented in Table I show a straight-line relationship for thickness of core and neck diameter

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GATES

UP TO a certain point it is possible to calculate riser sizes for castings of irregular outline by assuming that they consist of an aggregate of several simple shapes, and figuring the proper size of head for each such portion of the casting. The complications that result from the necessity of making allowances for portions of adjoining sections common to both, and other similar factors, however, make it next to impossible to go very far in this direction. Many steel foundrymen, especially those making comparatively small castings, however, have found it possible by using this method to secure sound castings with heads considerably smaller than those they formerly used, and thus have markedly increased their yield of good castings.

As already mentioned, there has recently been a revival of interest in the Washburn or necked-down head, and it has been quite generally adopted in progressive steel foundries. By its use, great savings can be made in the cost of burning off risers, especially when the heads are set on curved or irregularly shaped sections of the castings, so that after a neck-less head has been cut, a great deal of flame trimming is required. By making the outline of the Washburn core conform to the shape of the casting, and using a curved instead of a flat shape on top of the core, burning can often be confined to trimming off the stub of the neck after the head has been broken off. A core shaped in this way is shown in Fig. 29.

It always should be remembered that the only advantage of the Washburn type head is its saving in burning and trimming cost. The thin core between the casting and the head permits the Washburn riser to feed nearly, perhaps fully, as well as if no core were used and the head were brought down full size to where it joins the casting. Obviously, however, it can not feed any better than a plain solid riser.

Until quite recently, there was practically no published information to guide the foundryman in the design of necked-down heads and cores, and the lengths, shapes and sizes of the neck openings used were determined entirely by guesswork. As was to be expected, there were many cases where necked-down heads did not feed properly, and neck-less heads, which could be cut off quite cheaply, were substituted for them. Today, as the result of the organized research activities of the Steel Founders' Society of America, data have been accumulated that enables the

Use of the Washburn or necked-down head is described further in this fifth of a series of articles. The author also discusses center-line shrinkage in steel castings and methods of securing directional solidification

Sand HEADS
FOR STEEL CASTINGS

foundryman to design his heads and necks with reasonable certainty that the castings on which they are used will be solid. The method, therefore, is being adopted to a steadily increasing extent in steel foundries throughout the country.

The neck of a Washburn head may be formed either in a slab core of oil sand, properly stiffened with steel rods, or by using a suitably shaped slab made of fired refractory material. The latter may be obtained from one or more of the manufacturers of refractory brick and tile, and are less likely to break in handling than are sand cores. They do not disintegrate into a loose mass when heated by the steel, however, as sand does, and when it is not possible to "flog" off the heads, so that it is necessary to burn through the necks, they are harder to dig out than are sand cores. Their cost, too, may in some instances make their use inadvisable, especially when a standard size cannot be used. Naturally, this is often the case when the core must conform to a curved or irregularly shaped surface, and only a few castings are to be made from the pattern.

A considerable amount of heat is carried away from the necks of Washburn type heads by the sand or refractory material of the neck core, and the steel rods used to strengthen sand cores increases this loss of heat. The thickness of the core and the heat conductivity of the material of which it is made, therefore, determine the size of the neck opening required to enable the head to feed efficiently. One manufacturer of refractories[24] has published a bulletin giving recommended dimensions of refractory cores for Washburn heads which, it states, were "prepared in co-operation with the technical research committee of the Steel Founders' Society of America." Fig. 30, taken from this bulletin, shows the design of core recommended. The circular-shaped neck is considered preferable to one of rectangular outline, since it has less surface area per unit of volume, and therefore radiates heat more slowly. For the same reason, when oblong openings are required, they always should be made elliptical rather than rectangular.

Table I, from the same source as Fig. 30, gives the recommended dimensions of refractory cores made in accordance with the design, for use in connection with heads of from 2 to 12 in. in diameter. For the benefit of those who prefer to use charts rather than tables, the present author has plotted the neck diameters and core thicknesses given in this table, against

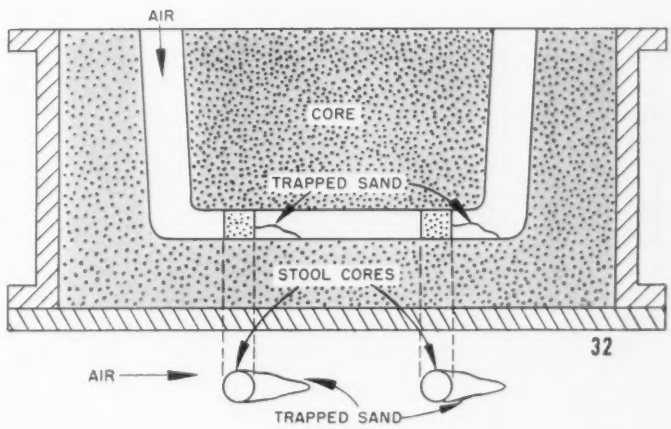


Fig. 32 — Loose sand in the cavity tends to lodge under the lee of the stool cores

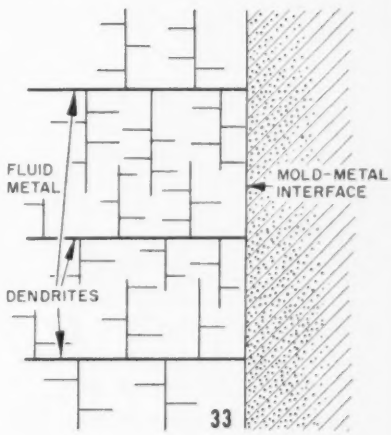


Fig. 33—Diagrammatic representation of the freezing or solidification of steel

the riser diameters, as shown in the chart, Fig. 31. It will be noticed that the ratio of head size to neck opening and to core thickness follows a straight-line relationship. Not only does this chart enable the foundryman to select the proper core dimensions to use with different sized heads but, by extrapolation, the proportions of cores for heads larger than 12 in. in diameter may be determined with a fair degree of accuracy. As experience has often shown it to be desirable to use somewhat larger neck openings than those recommended in this bulletin, extrapolation of the lines in Fig. 31 can be safely employed.

Because of differences in relative heat conductivity, the figures for rodded oil sand cores differ slightly from those given in the table, but the differences are

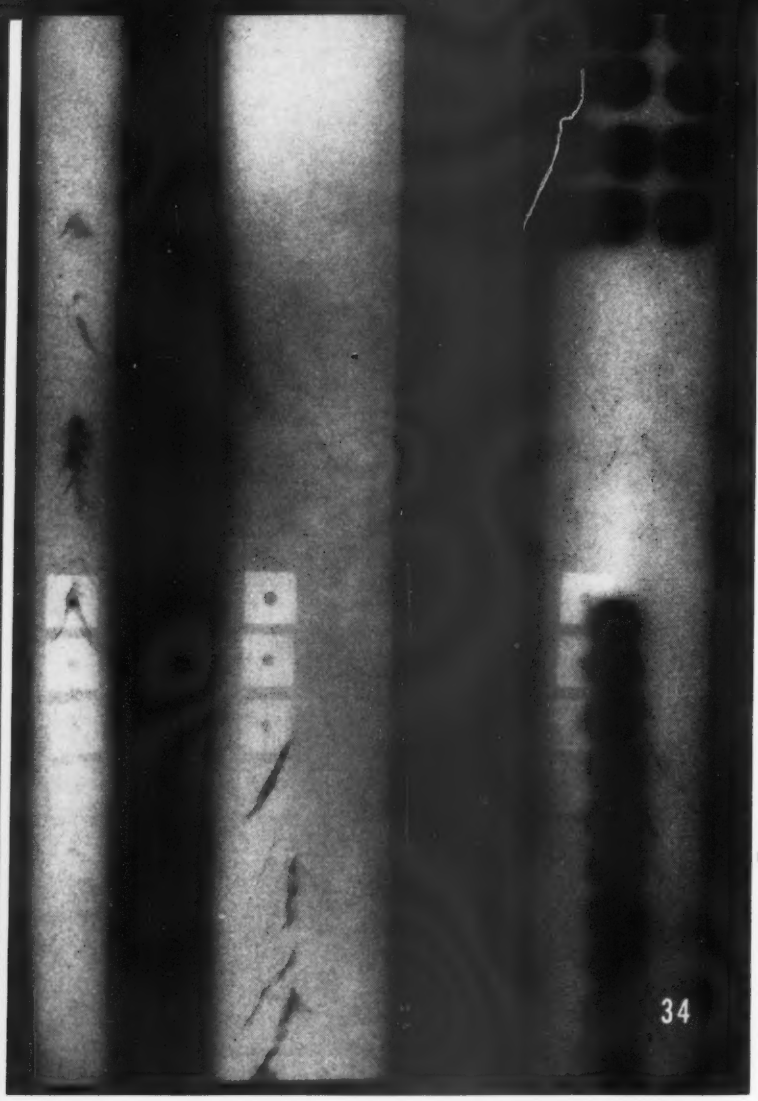


Fig. 34—Center-line shrinkage in 1 and 2-in. sections. Holes in specimens mark location of drillings for chemical analysis. (Brinson and Duma, *Transactions*, AFS, 1942)

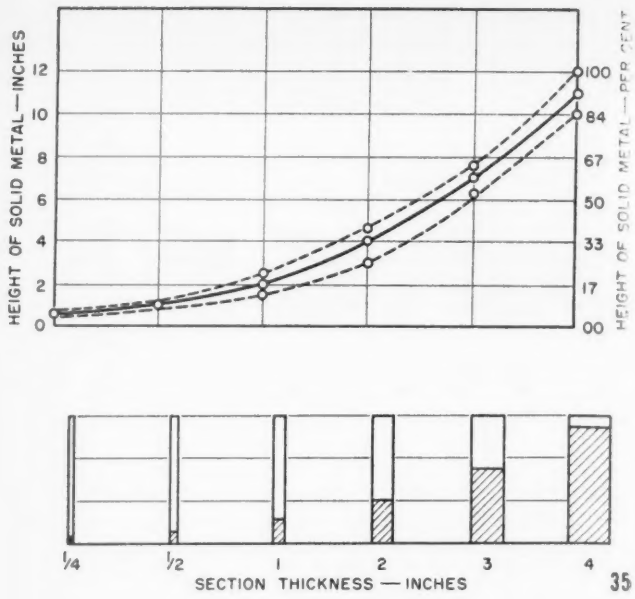


Fig. 35—Effect of section thickness on center-line shrinkage. Curve shows height of solid metal in unpadded sections 12 in. high

quite minor and relatively unimportant, so that the dimensions of sand cores may be closely approximated from the table.

The diameters and heights of the heads themselves, of course, are determined by the same rules as are those of solid, un-necked heads. The minimum figure for head diameter, 1.15 per cent of the casting thickness, holds good for Washburn heads as well as for solid ones.

Washburn cores may be used with both top attached and side attached heads. Since in using the latter the steel is fed into the casting through the head and neck, it is necessary to use an opening considerably larger than the minimum dimension obtained from the table, in order to avoid choking off the flow of metal. To a certain extent the same thing is true of top attached heads, since unless the steel is very hot, it will not flow readily into the heads through an opening that Table I would show to be amply large. The pressure of the steel may then bend the core upward, or even break it across. In this respect, refractory cores have a certain advantage over sand ones, as they are usually somewhat stronger and therefore less likely to break under the pressure of the rising metal.

As mentioned above, it has frequently been found that neck openings somewhat larger than those given in the table should be chosen. This is especially true of the cores used with heads of diameters over 12 in. Not only must the steel be able to flow readily through the neck opening, but the air in the mold cavity must also be free to escape as the steel runs into the mold. If Washburn heads with very small necks are set at or near one end of long castings of comparatively small cross section, the escape of the air may even be so slowed up as to produce serious blows and misruns which are due simply to entrapped air that could not get out in time to permit the steel to completely fill the mold cavity. In cases of this sort, extra vents or pop-offs are sometimes provided to supplement the neck openings as passages for the escape of air and mold gases.

There are instances, too, where a crack will be found in a casting made with a necked-down head, but if a solid head is used, the piece will not crack. This occurs in castings of various thicknesses, though perhaps it is more often seen in pieces of small cross section but considerable length. Either a solid head or a Washburn head produces a "hot spot" in the steel immediately under it, which tends to tear because of contraction stresses in the piece. Apparently with the Washburn head, the steel is more likely to crack because there is no additional thickness of metal to resist the stress, whereas the solid head reinforces the section and so keeps it from failing. Whatever the explanation, experience has shown that enlarging the size of the neck, or sometimes using a solid head, will prevent the formation of these cracks or tears.

In certain cases it has been found that there is a considerable amount of carbon segregation in the

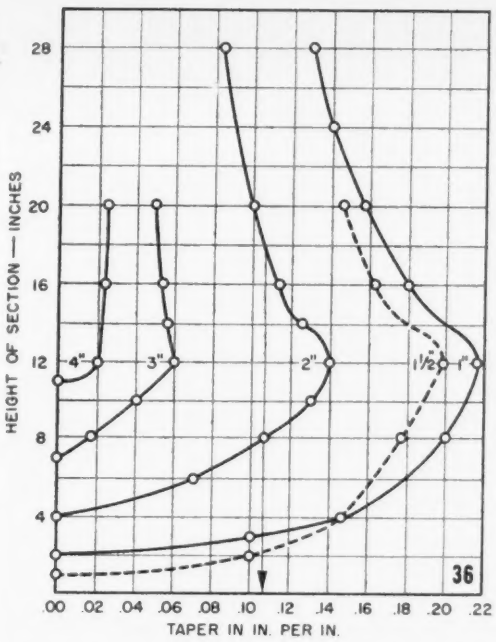


Fig. 36—Taper in inches per linear inch of section required to obtain solid metal in sections of various height and thickness

area immediately under the neck of a Washburn type head. Apparently the degree of increase in carbon content varies directly with the size of the casting. In a casting 30 in. in diam, steel with a ladle analysis of 0.22 per cent C showed a C of 0.60 per cent at the point where neck and casting joined. In other cases a similar but less extreme degree of segregation has been found to exist. It is quite possible that in some of the worst cases this segregation was due to carbon carried down into the casting from carbonaceous pipe eliminator, as described above, rather than to true segregation. Further experimentation is needed to determine whether carbon segregation always occurs with Washburn type heads, and if so, how large an area is affected and whether the local increase of carbon content is serious enough to affect the usefulness of the castings.

There are often many places in castings, especially those of complicated shape and large size, where loose sand will lodge as the flowing steel carries it along. It is usually necessary to increase the size of the sections at these places and burn or machine off the extra metal, in order to get rid of the trapped sand. The most familiar instance of this practice is the extra finish allowance ordinarily used on the cope surface of sizable jobs. The extra sections are commonly known as "dirt traps," and as a rule serve their intended purpose fairly well. They will be much more effective, however, if they can be so located that the closing gang can blow the loose dirt into them with the air hose, and remove it with an air-operated suction device through an opening in the cope provided for the purpose. The mold then can be cleaned out thoroughly before it is poured.

TABLE I—Dimensions for Necked-down Cores

Riser Diam, in.	A in.	C in.	D in.	F & G in.	H in.
2	3	¾	⅛	⅛	1⅛
3	4	⅞	⅛	⅛	1⅛
4	5	1⅛	⅛	⅛	1⅛
5	6	1⅛	⅛	⅛	2⅛
6	7	1⅝	⅛	⅛	2¼
7	8	1⅞	⅝	¼	2⅝
8	9	2¼	⅝	¼	3¼
9	10	2½	⅞	¼	3¾
10	11	2⅞	1	¼	4⅛
12	13	3⅝	1⅛	¼	5⅛

In using compressed air to blow out a mold, it is too often assumed that if a closed space is blown thoroughly from one side, all loose sand will be swept out. If the space in question is spanned by cores—for instance, those used to support a larger core—the sand will often lodge in a long triangular mass under the "lee" of the stool cores, as indicated in Fig. 32. To be sure that all loose dirt is removed from such places, which cannot be seen from above, the men doing the closing should be provided with small mirrors fastened to the ends of light wooden sticks by means of thin metal strips. The mirrors can be set at such an angle that when lowered through a head or some part of the mold cavity and illuminated with a flash-light they will show the hidden spaces. One would suppose that the flowing steel would sweep away loose sand left in places like this, but quite often it will flow over the sand instead, producing a dirty spot, or even an actual misrun in the casting.

As mentioned previously, thin sections of cast steel frequently cannot be made perfectly solid by means of risers alone. This is because the soundness of such sections is greatly affected by the manner in which steel solidifies. As it cools, the metal in immediate contact with the walls of the mold first freezes in a rather thin layer of equi-axed crystals. From the inner surface of this frozen metal, dendritic crystals of pine-tree shape then shoot out into the remaining liquid. As they grow, side branches and twigs extend from their main stems, as indicated in Fig. 33. The growth of the side branches traps tiny pools of liquid metal between their ends as neighoring crystals come together, and at or near the middle of the section even larger areas of liquid steel remain between the tips of the main dendrites. The freezing contraction of the last portions of this steel to solidify creates voids, and necessarily there is no further liquid metal available to fill them. Radiographic examination reveals irregularly shaped discontinuities at and near the median line of the section, and deep etching often brings out the smaller ones lying between adjacent dendritic crystals nearer the outside of the piece; the former are called "center-line shrinkage" areas, the latter are what the metallurgist knows as "micro-shrinkage."

In larger sections, the dendritic crystals do not extend to the median line, and the steel between their ends, at and near the center of the piece, solidifies in equi-axed rather than elongated crystals. In these heavier parts, the force of gravity or of atmospheric pressure, produced by heads of adequate size, is able to drive feed metal between the ends of the dendrites, and centerline shrinkage does not occur. The interlaced dendritic crystals in the thinner pieces offer so much resistance to the flow (*Please turn to page* 257)

QUESTIONS and A

Applying Dual-metal Casting

Q.—With reference to the article on recent developments in centrifugal casting which appeared in the August, 1951 issue, we would appreciate some advice on a possible application of the dual-metal casting described therein. We would like to know if it would be possible to replace manganese (14 per cent) steel bucket bushings used on tin dredges with centrifugally cast ones with an outer layer of tough alloy steel and an inner layer of hard alloy (4.5 Ni-1.50 Cr) iron. Point in doubt is whether such a bushing would be capable of withstanding the crushing stresses and shock loads imposed in service without cracking the hard alloy iron. Typical bushing is 7¼ in. OD, 5 in. ID, and 16 in. long.

A.—While it would be possible to make a composite bushing as you describe with two layers of different alloys, we believe that under the stresses to which the bushings are subjected in service the hard alloy iron would crack. Also we believe that even if the latter would stand up and not crack it would not give as long life as manganese steel, but would wear out more rapidly. Bucket bushings for gold, tin, and harbor ladder dredges are an ideal application of manganese steel, according to experience in this country.

Investment Mediums for Molds

Q.—We want to make a few small, smooth-surfaced, intricate castings for an experimental purpose, and the lost wax method, we think, offers the best solution since other methods would involve making extra coreboxes. Can you send us information on investment or lost wax molding material such as type and sizes of investment sands or material, the kind of binders, or solutions used with the investment? Will it be possible to produce aluminum castings of 3/64 to 1/16-in. wall thickness without using air pressure on the metal immediately after it is poured? By using an insulating material on top of the sprue, will the metal stay liquid long enough to fill the mold completely? When producing the mold and melting and burning out the wax, should the metal be poured while the mold is still very hot or before it cools back to room temperature, or can the metal be poured into a mold that is at room temperature?

A.—A wide variety of investment compositions are on the market. Those used with nonferrous alloys (gold, brass, bronze, etc) in general are composed of plaster of paris and silica, while investments for high-melting-point alloys such as steel are principally silica.

In commercial practice the usual method is tc use two kinds of investment—a finely ground material applied to the pattern as a thin shell, and a coarser, cheaper material for the backing. Procedures of applying the ground coat or fine material to the pattern vary. In some cases the pattern is dipped into a thin slurry of the material, and allowed to air-set, and then dipped again until the desired thickness is built up. Other times the dipping in the slurry is employed, but the coating is only allowed to dry so that it is tacky, and then some of the dry, fine material is blown or sprayed on. Another method is to spray the pattern with a solution of tetraethyl silicate or a solution of silicate of soda (or dip the pattern in such solutions), and allow it to become tacky, and then it is sprayed with dry, fine material. After the coating has dried sufficiently, the assembly is placed in the flask or casing and the coarser backing material poured around it.

We believe it will be preferable to purchase the molding mediums instead of trying to make them—at least at the beginning, or if only a small amount is to be used. In regard to fineness, Nieman in *Transactions*, AFS, 1944, mentions 85 per cent passing through a 325-mesh sieve, and also that the investments are formed of 60 to 80 per cent silica and the remainder plaster.

We do not believe you will have any trouble filling out the sections you mention, because the investment is a good insulating material, and the mold is poured while it still is hot. Molds tend to crack if allowed to cool to room temperature. Temperature at which the mold is used will probably be a compromise between several factors. First, if close tolerances on dimensions are desired, the mold expansion characteristics at various temperatures will have to be considered. On the other hand, high mold temperatures with resultant slow cooling will tend to produce coarse-grain structures in most alloys, including aluminum.

Matchplates and Follow Boards

Q.—We shall appreciate information on suitable materials for making matchplates and follow boards.

A.—A wide variety of materials, including proprietary compounds, is available for the purpose. Manufacturers of the latter may be found in the advertising pages of FOUNDRY. Choice usually depends on whether the device is expected to serve temporarily or for a more or less extended period. Probably the simplest is a mixture of one shovelful new molding sand, a handful of litharge and a cupful of linseed oil. A stronger mixture contains 89 parts finely sifted molding sand, new or old, 1 part fine iron borings, 3 parts litharge. This is mixed dry and moistened with linseed oil to the consistency of molding sand. An-

dAnswers

other mixture used extensively for pattern plates, matchplates, follow boards and odd sides contains 2 parts portland cement, 1 part plaster of paris, 1 part sharp sand. A mixture designed for more severe service and longer life is made up of 74 parts asphalt, 24 parts plaster of paris and 2 parts plumbago.

Almost any metal may be employed for pattern plates. Since light weight is desirable, an alloy containing 93 per cent aluminum and 7 per cent copper is suggested. In some instances antimony and bismuth are added in small quantities to counteract or reduce shrinkage.

Construction of a Small Cupola

Q.—We have a laboratory project of building a small 8 to 10-in. diam cupola for use in our school's metallurgical department, and want to keep the design and construction as simple as possible. Can you give us any suggestions or references to descriptive material?

A.—Presumably you have available bound volumes of FOUNDRY for reference, and we suggest you consider the article "Construction and Operation of a 15-inch Cupola" by Fulton Holtby in the August, 1941 issue. It describes a cupola built and used at the University of Minnesota. Holtby mentions use of 24-in. diam hot water tanks, but for your smaller cupola, 18-in. diam or what are known as 66-gal tanks would serve with a 4-in. rammed lining for 10-in., or 5-in. lining for 8-in. diam.

A more elaborate cupola is the 10-in. diam unit at Battelle Memorial Institute, and an excellent description of it is presented in *Transactions* of the American Foundrymen's Society, 1949, in the article "Design and Operation of a 10-in. Diameter Cupola" by D. E. Krause and H. W. Lownie Jr. While you may not want to follow the design in detail, we believe a study of the article will be well worth while.

Melt Iron in Electric Furnace

Q.—We operate an iron and steel foundry in the Northwest using the electric furnace process for steel and the cupola for iron. We have been experimenting with making iron in the electric furnace; enough so as to realize that it would be to our benefit to switch to electric melting, and are planning to add another electric furnace. We wonder if you have available any information on electric melting of iron or perhaps a bibliography on the subject. Raising the carbon content over 3.2 per cent seems to be our greatest problem, using an all-cast scrap charge in an acid-lined furnace.

A.—So far as we know there is no bibliography relating to melting cast iron in the electric furnace. Barton's book *Refining Metals Electrically* contained several chapters on the subject, but it has been out-of-print for many years. An extensive paper "Gray Iron Production in the Direct-arc Acid-lined Electric Furnace" was presented by Clyde L. Frear at the 1933 meeting of the American Foundrymen's Society, and available in the *Transactions* for that year. However, it appears to us that with your experience in steel melting, it should not be too difficult for you to develop satisfactory practice in production of gray iron.

Frear mentions that one of the points to be watched is the tendency of silicon pickup concomitant with reduction of carbon at high temperature, and advises keeping the temperature around 2700°F as well as tumbling all return scrap to remove adhering sand. No ferrosilicon should be added in the charge. Increasing the carbon content of gray iron essentially is a temperature-time proposition, and with some attention to certain details, raising the carbon content to the desired level should not be difficult.

Relative to carbon increase Barton specifies use of a dense, low-ash carburizing agent and more recently Riley in a paper before the Institute of British Foundrymen showed a much higher carbon pickup with low-ash materials. While Frear did not go into that phase, he indicates low-ash preference indirectly by stating that petroleum coke is used almost exclusively as a recarburizer. Hence, suitable carbon addition agents would be petroleum coke, graphite electrode stubs, graphite briquets, or graphite crushed to ¾-in. to 30 mesh. According to Frear, the petroleum coke

GANGWAY!

By J. A. PATTERSON

"I just stand here, dumb-like. You'd be surprised how much change I pick up!"

QUESTIONS *and Answers*

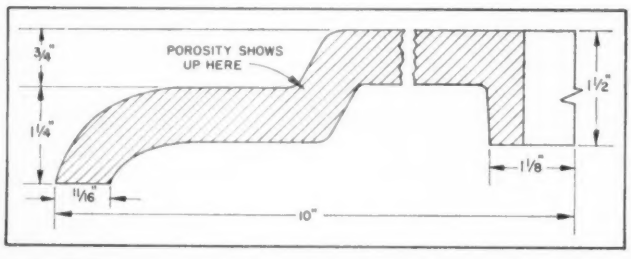
should be crushed to walnut size, and the same would apply to graphite briquets and electrode stubs.

Frear suggests placing the carburizing agent on the bottom of the furnace, and presumably in the center as recommended by Barton, so that it is at the point of highest temperature, and in longest contact with the molten metal. In regard to amount of carburizing agent to be added, Frear mentions the calculated amount plus 25 per cent—the calculated amount being the difference between total carbon in the charge and the desired value. Presumably you will have to experiment to determine the carbon recovery, and standardize your practice.

Following melt-down Frear calls for raising the bath temperature to about 2600°F, raking off the slag and excess coke, and then adding sufficient lime to make a very thin slag blanket. A small amount of fine coke is added as well as sufficient fluorspar to provide fluidity. Test bar then is poured and analyzed for carbon and silicon. If carbon is low, coke must be added and the temperature increased. Ferrosilicon and ferromanganese are added if required. When composition is adjusted, bath temperature is raised as rapidly as possible to pouring temperature.

Mold Appears To Lack Stability

Q.—We are sending you a portion of a casting with which we have been having considerable difficulty. The job is a round base 20 in. in diam having a cross section as indicated in the accompanying sketch. Analysis of the iron is 3.35 per cent TC, 2.34 per cent Si, 0.35 per cent Mn, 0.07 per cent S and 0.50 per cent P. Cupola charge is composed of 25 per cent pig iron containing 2.90 per cent Si, with the remainder good, light machinery scrap, automobile scrap and our returns. Cupola is lined to 32 in., and the bed is 42 in. high. Castings are chromium plated, and in preparation for that operation the surface is machined. When turning off the surface a porous, segregated area as indicated in the sketch often is uncovered and the castings are rejected. Molds are faced with synthetic sand composed of Ottawa silica sand, western bentonite and wood flour. Moisture is held to 5 per cent, and permeability runs 50 to 55. We have tried various methods of gating around the circumference and on the hub without any success. We are careful not to use other than thoroughly dried ladles, and since bases are poured all through the heat, the trouble cannot be blamed on iron boiling in the ladles.



Porous areas appear on upper part of curved section

A.—Examination of the dark colored area in the curved section of the casting submitted for study shows it to be a definite shrink, and we can only attribute its occurrence to a slight movement or yielding of the mold walls after feeding has ceased. That conclusion is borne out by the slightly swelled or thickened appearance of the flat section between the two curved portions—a condition which we do not believe is due to the contour of the pattern or to drawing the pattern from the mold.

The remedy, of course, is to increase the stability of the mold, and this may be accomplished by ramming harder and seeing that the bottom board is rubbed on firmly. If the molds cannot be rammed any harder than at present, due to occurrence of blows, then you will have to try increasing the amount of wood flour or substitution of southern type bentonite for the western type in part or altogether.

Has Trouble with Iron Sparking

Q.—We melt gray iron in a 54-in. ID cupola under conventional methods using 25 per cent pig iron and 75 per cent selected scrap consisting of boiler sections, radiators, some machinery, etc., with a cupola addition of 15 lb ferrosilicon briquets to each 1200 lb charge. We use 180 lb coke splits and a bed of 2200 lb. We have two types of pig iron containing 2.43 per cent and 1.75 per cent Si, and use one for about a month and then change to the other. Approximate analysis of iron over the spout is 2.25 per cent Si, 0.115 per cent S, 0.453 per cent P, 0.68 per cent Mn, and 3.35 per cent TC. On random days with no particular consistency we find sparks flying from our mixing ladle, and when that occurs it generally lasts for the entire day; whereas on the following day we see no sparking. We have noticed when we do have sparking, the chill area on our chill bars is greater. When we notice the sparking condition, we add some ground ferrosilicon in the pouring ladle which, while not eliminating the sparking, does reduce the chilled area in the bars to some degree.

A.—Since no melting rate is shown we are assuming that a normal rate of 11 tons per hour exists. If the melting rate is faster than that, we can expect oxidation in the cupola to increase. Percentage of return scrap used in the mix is not shown, and we are assuming that whatever is used will be part of the 75 per cent scrap of the charge. Sparking from the iron represents oxidation either from conditions inside the cupola or the type of scrap used. Without knowing the melting or wind rates, and since 180 lb coke to 1200 lb iron is being used, we will assume that oxidation within the cupola is normal. This leaves the scrap as the other possible source of oxidation. Chill tendency increases with oxidation, and since the occurrence is inconsistent we would look for trouble in the iron (scrap) charged.

Hard iron in the charge or badly rusted material or burned iron will cause the conditions noted. This can be checked easily by carefully selecting the scrap for a few days and observing results. For example,

(*Concluded on page* 120)

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ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

QUESTIONS *and Answers*

(*Concluded from page* 118)

use only good machinery scrap with the pig iron. It must be kept in mind that shop returns where the metal has been produced from bad original iron, will reflect that condition when remelted. This is particularly noticeable with a low pig iron content in the charge, and more so when shop returns constitute a high proportion of the scrap addition. As an additional precaution it is suggested that the coke be screened over a coke fork which has every other tine removed. Small coke is a constant source of oxidation within the cupola because of poor air distribution, and means high total coke costs. Roughly, the size of the coke should be one-twelfth the diameter of the cupola which, in the case of your 54-in. unit, would be 4½ in. Possibly your coke on arrival is large enough, but due to lack of care in unloading and in handling it into the cupola, it is broken into much smaller size.

Another possible cause of your trouble is lack of uniformity in bed height. You mention that you use about 2200 lb in the bed, and the assumption is that it is placed by weight rather than by volume. Best practice is to establish the proper height above the tops of the tuyeres and measure by extending a rod down from the charging door each time *after* the bed has burned through thoroughly. According to the *Handbook of Cupola Operation* the bed height for a 54-in. cupola may vary from 45 to 51 in. above the tops of the tuyeres.

Use Sodium as Modifying Agent

Q.—In the January issue of FOUNDRY it was suggested to use an addition of metallic sodium to cure a mottled appearance in an aluminum-silicon alloy. We would like to know of an efficient method for adding the sodium. We have electric induction furnaces, and have considerable trouble getting enough sodium into the metal to achieve the desired results. We pour at 1400 to 1450°F.

A.—Two procedures for adding metallic sodium to aluminum alloys are available, and the choice will depend upon the quantity of metal to be modified and the particular operating methods. One method is to place the required amount of metallic sodium in the bottom of a preheated crucible or ladle, and then pour the molten aluminum alloy over it in such a manner that the sodium is mixed in well. Since sodium has a low specific gravity, some skill and experience is needed to incorporate it into the aluminum.

The other method, and the one we suggest for your work, is to wrap the metallic sodium in aluminum foil, place it in a graphite phosphorizer, and plunge the whole to the bottom of the crucible or pot. As you know, sodium as a modifier is what is termed a "fugitive" element; that is, its modifying effect disappears after a period of time, hence, molten metal after addition of sodium should not be held for long periods before pouring. Reaction between sodium and aluminum to accomplish modification takes 3 to 5 minutes.

It might be pointed out also that addition of the sodium preferably is made outside the induction furnace since the "pinch effect" or rolling action of the bath tends to cause a more rapid rate of loss of sodium. Metallic sodium has a specific gravity of about 0.97, and weighs slightly over ½-oz per cu in. It usually is available in sticks of about ⅝-in. in diam, so a piece of stick 3 in. long will weigh about ½-oz. You undoubtedly are aware that metallic sodium must be kept under kerosene or similar material free from water and free oxygen, and should not be touched with the hands.

Cylinders Leak under Pressure

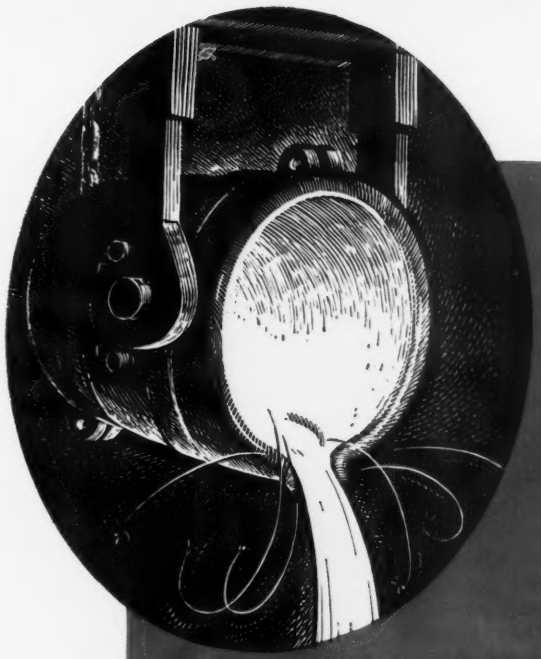
Q.—Tested under 160 psi after machining, our marine liquid cylinder castings, approximate weight 500 lb, show signs of leakage. The cupola mixture includes 75 per cent good machinery scrap and 25 per cent pig iron. Metal analysis is: Si 2.45, S 0.032, P 0.54, Mn 0.85. We add 1 per cent nickel shot and 2 per cent ferromanganese to the metal in the ladle. The molds are dried. With high-grade coke and 11 oz air pressure the metal leaves the stack at a temperature between 2800 and 3000°F.

A.—Your present metal composition and cupola practice should produce satisfactory castings. Tensile strength of the iron could be increased considerably by replacing 10 to 15 per cent of the machinery scrap with an equivalent amount of steel scrap. However, since the castings are pressure tested at only 160 psi, high tensile strength is not a factor in your problem.

Castings leak because the metal is porous, and porosity in turn is caused either by shrinkage or agitation. If the leakage appears in only one area, it is probably due to shrinkage. This type of leak usually may be traced to faulty design. One part of the casting is thicker and heavier than an adjoining section, say the junction of a heavy flange. The metal does not solidify uniformly.

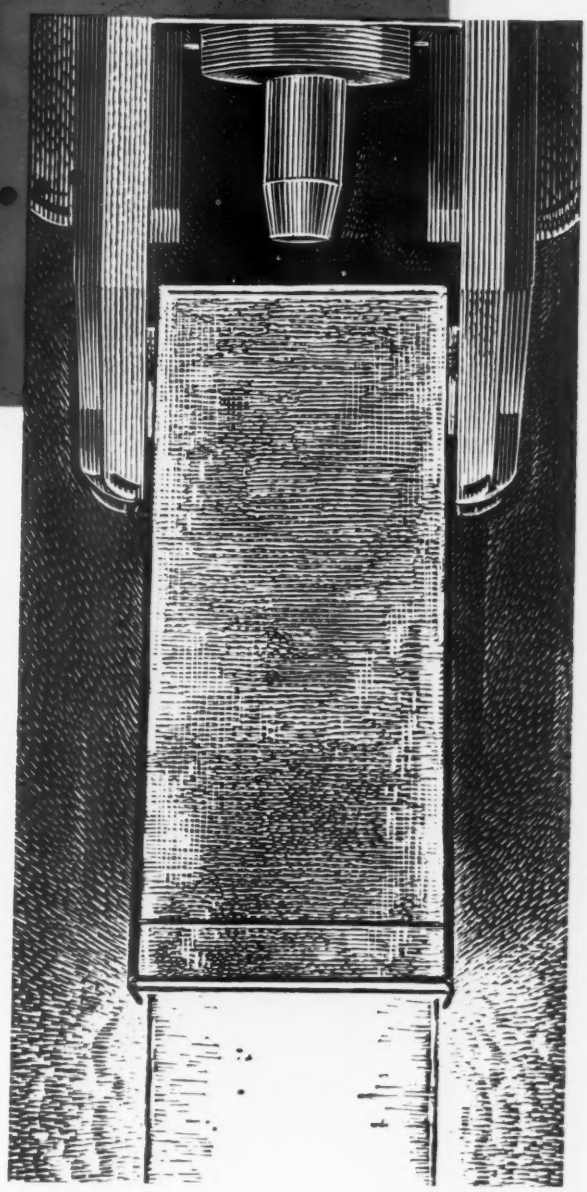
From your description we are inclined to the opinion that the oozy leak in your castings is due to agitation in the metal. If the leakage was profuse and extended over a large area—laconic foundry term is "leaking like a sieve"—the cause might be oxidized metal, wet ladle lining, wet mold or core. In your case we may dismiss the first three items and thus focus suspicion on the core. A core that is not thoroughly dry, a core that is not adequately vented, may not react violently when covered with molten metal, but it may react sufficiently to set up a mild tremor or agitation in the metal with resultant fine porosity in the casting.

We suggest you use a more permeable core sand mixture, increase the number and size of the vent passages, possibly reduce the amount of core binder, and dry the core thoroughly. Where the leakage is confined to one definite area and the design cannot be changed, introduction of a chill inside or outside will equalize cooling speed.



POUR FASTER...

STRIP FASTER.



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MEN

of Industry

HENNING A. FORSBERG, vice president, Continental Foundry & Machine Co., East Chicago, Ind., has been elected president of the Steel Founders' Society of America. Mr. Forsberg joined Continental at East Chicago in 1915 to do general office work. In 1923 he was made production engineer and five years later he was named assistant general superintendent. In 1931, Mr. Forsberg was appointed general superintendent of the East Chicago Division and in 1945 he became manager of operations of all the company's works. He has been vice president since 1948 and was elected a director of the company in 1951. Previous service to the SFSA includes chairmanship of the Chicago District Operating Group in 1940 and a term as a director of the society.

♦ ♦ ♦

Dr. Lauriston C. Marshall, professor of electrical engineering, University of California, Berkeley, has been named director of Link-Belt Co.'s new physical testing and research laboratory in Indianapolis. Dr. Marshall, a graduate of Park College, did graduate work at University of California and Princeton University. He is currently carrying on nuclear research for the Atomic Energy Commission and will take over his new duties with Link-Belt Co. as soon as he can be released from his present projects.

♦ ♦ ♦

William J. MacNeill recently was named vice president in charge of operations, Badger Malleable & Mfg. Co., South Milwaukee, Wis. A native of Wisconsin, Mr. MacNeill first became associated with the foundry industry there in 1919, joining the Federal Malleable Co., West Allis, Wis. He resigned as president-general manager of that company in 1945 to become general manager of the G.H.R. Foundry Division of Dayton Malleable Iron Co., Dayton, O. Three years later he was named assistant to the president of Dayton Malleable Iron Co., and for the past year was foundry manager, Acme Aluminum Alloys, Dayton. Mr. MacNeill has served as a national director of AFS and was president of the society's Wisconsin Chapter in 1939-40.

♦ ♦ ♦

Robert Spurgin III has joined National Engineering Co., Chicago, as field engineer. He will represent the company in southern Ohio and Kentucky, and will do engineering work in Indiana and Michigan. Formerly associated with Swayne, Robinson & Co., Richmond, Ind., Mr. Spurgin had served as assistant chief engineer, metallurgist, foundry superintendent and finally was in charge of engineering and development. He is chairman of the Central Indiana Chapter of AFS. **C. E. Wenninger,** director of foundry research and development, University of Kentucky, has joined the Research & Development Division, National Engineering but will continue to devote part of his time to work of the research foundation. Mr. Wenninger has been associated with Crawford Steel Foundry Co., Bucyrus, O., Standard Steel Works Division, Baldwin Locomotive Works, Burnham, Pa., and has done research work on methods of sand reclamation for the Steel Founders' Society of America.

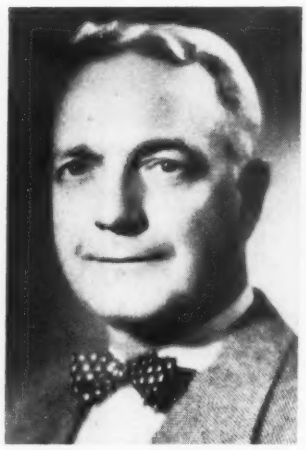
♦ ♦ ♦

Charles Morrison, who resigned recently as general manager, Benton Harbor Malleable Industries, Benton Harbor, Mich., has joined the Mutual Security Agency as foundry consultant and will make his headquarters in Copenhagen, Denmark.

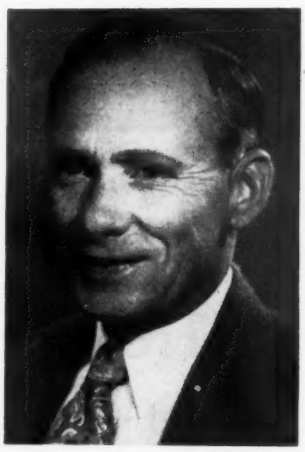
♦ ♦ ♦

Frederick J. Benn has been appointed field engineer in the Cleveland area, Norton Co., Worcester, Mass. With headquarters in the Louisville area he will work jointly with Norton's abrasive engineer in eastern Kentucky and under the dis-

(*Continued on page* 124)

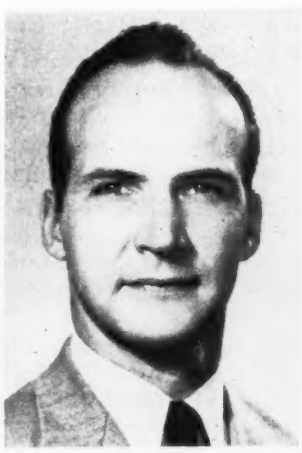


HENNING A. FORSBERG
. . . president, SFSA



DR. LAURISTON C. MARSHALL
. . . heads Link-Belt research

WILLIAM J. MacNEILL
. . . v.p., Badger Malleable



ROBERT SPURGIN III
. . . National field engr.

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(*Continued from page* 122)

trict manager in Cleveland. Mr. Benn, a graduate of Worcester Polytechnic Institute, recently was a grinding engineer in the company's Worcester sales engineering department.

♦ ♦ ♦

Charles H. Barnett has been appointed assistant to the president, Foundry Equipment Co., Cleveland. Mr. Barnett was graduated from Cornell University following service in the U.S. Army during World War II. He has been associated with the Foundry Equipment Co. since 1947, serving as sales engineer and also handling technical publicity.

♦ ♦ ♦

John W. Janca has been appointed sales manager, Westlectric Castings Inc., Los Angeles. Mr. Janca joined the organization in 1942 as a member of the production control department. His work from then until 1948 brought him in contact with the various departments of the foundry and since 1948 he has devoted his entire time to the sales department. A native of Chicago, Mr. Janca was graduated from Illinois Wesleyan University in 1940.

♦ ♦ ♦

P. J. Slavish, for the past year manager of the Pittsburgh office of Baldwin-Lima-Hamilton Corp., Philadelphia, has been appointed to handle testing equipment sales in the Pittsburgh area, formerly under Philadelphia sales direction. The area includes western Pennsylvania and West Virginia. Mr. Slavish will continue to represent the Standard Steel Works Division and Cramp Brass & Iron Foundries Division. He was associated for 16 years with Standard Steel Works Division, Baldwin Locomotive Works, Burnham, Pa.

♦ ♦ ♦

George E. Brown has joined United States Graphite Co., a division of Wickes Corp., Saginaw, Mich., as a sales engineer for graphite products. Since service during World War II in the U.S. Navy, Mr. Brown has been a metallurgist in the Gary, Ind., works' research and development department of United States Steel Co. He is a metallurgical engineering graduate of Michigan College of Mining & Technology.

♦ ♦ ♦

John M. Marston has been appointed by C. O. Bartlett & Snow Co., Cleveland, to establish an office for the company in Pittsburgh. He will

JOHN M. MARSTON
. . . *establishes area office*

represent all Bartlett & Snow equipment, including handling systems for foundry sand, molds and castings, and continuous and batch dryers. His office is located at 91 Central Square, Pittsburgh 28.

♦ ♦ ♦

Leroy Montgomery has been appointed representative in West Virginia, western Pennsylvania, eastern and northern Ohio, for Quigley Co., New York, with headquarter in Pittsburgh. Other appointments announced by the refractory products company include: **Ira Stark,** representative in New York and the New England states; **Jack Pittman,** representative in Texas, Louisiana, Alabama, southern Mississippi and southern Arkansas; and **Bud Reagan,** sales representative in Missouri, Kansas, Nebraska, Iowa, North and South Dakota, Minnesota, Wisconsin and Chicago area.

♦ ♦ ♦

William Selgrath, who joined the foundry industry 28 years ago at the Henry Vogt Machine Co., Louisville, Ky., has returned to that organization as foundry superintendent. In the intervening years Mr. Selgrath has been associated with B. F. Avery & Sons, Louisville; the Western Foundry Co., Chicago; Canedy-Otto Mfg. Co., Chicago Heights, Ill. and John Deere Dubuque Tractor Co., Dubuque, Iowa, in production and supervisory positions.

♦ ♦ ♦

Dr. Robert J. Anderson has left the Aluminum and Magnesium Division, National Production Authority, Washington, and has joined the Southwest Research Institute, San Antonio, Tex. Following a wide experience in the light metals industry, Dr. Anderson was formerly a consulting engineer, specializing in the metallurgy of aluminum and magnesium.

♦ ♦ ♦

Edgar F. Gore, who for 6 months has been with the Light Metals Section, National Production Authority, Washington, has returned to Michigan Smelting & Refining Division, Bohn Aluminum & Brass Corp., Detroit, to resume his position as sales manager.

♦ ♦ ♦

Dr. Donald J. McPherson, recently research metallurgist, has been named head of the newly formed physical metallurgy section in the metals department, Armour Research Foundation, Illinois Institute of Technology, Chicago. **Harold B. Kessler** has been

(*Continued on page* 126)

CHARLES H. BARNETT
. . . *assistant to president*

JOHN W. JANCA
. . . *Westlectric sales mgr.*

P. J. SLAVISH
. . . *equipment sales, B-L-H*

GEORGE E. BROWN
. . . *sales, U. S. Graphite*

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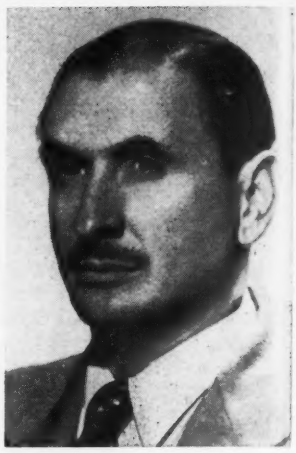
G. B. DAVIS
. . . sales v.p., Baker-Raulang

DONALD H. RISHOR
. . . Frederic B. Stevens sales



N. S. COVACEVICH
. . . chairman Mexico chapter

(*Continued from page* 124)
appointed supervisor of the foundation's nonferrous metallurgy section. As a research metallurgist, Mr. Kessler specialized in precision casting and in high temperature alloys. He is chairman of the precision casting subcommittee of the AFS.

♦ ♦ ♦

Walter W. Moore, works manager, Burnside Steel Foundry Co., Chicago, has been elected a vice president of that company. Associated with the organization since 1934, he was made foundry superintendent in 1941 and works manager in 1948. He is currently serving as chairman of the Chicago Chapter of the AFS.

♦ ♦ ♦

G. B. Davis, since 1948 sales manager, Baker-Raulang Co., Cleveland, has been named vice president-sales, succeeding **John R. Morrill,** resigned. Mr. Davis was graduated from Hillsdale College and entered the purchasing department of the company in 1935. He was transferred to the sales department in 1937 and became assistant sales manager in 1945.

♦ ♦ ♦

Donald H. Rishor has been added to the sales staff of Frederic B. Stevens Inc., Detroit, and will operate from the Buffalo branch. Mr. Rishor has served as foundry consultant and for nine years sold foundry sands and refractory materials in New York and Pennsylvania. Prior to that he was assistant works manager at Symington-Gould Corp., where he was employed for 15 years.

♦ ♦ ♦

N. S. Covacevich, general sales manager of La Consolidada S.A., Mexico, D.F., is currently serving as chairman of the Mexico City Chapter of the AFS. A native of Mexico, Mr. Covacevich was educated in Texas and studied mechanical engineering for three years at Texas A and M College. After an association of approximately 15 years in the petroleum industry, Mr. Covacevich organized his own business to sell foundry equipment and supplies. He joined La Consolidada S.A. in 1947 as manager of sales for its steel casting division. In 1950 he was promoted to manager of the foundry division, serving in that position until January, 1952, when he was appointed to his present position. One of the founders of the Mexico City Chapter, Mr. Covacevich served as secretary-treasurer of the group for four years. In addition, he is a member of the American Society for Metals, American Institute of Mining & Metallurgical Engineers, and represents his company in the Steel Founders' Society of America.

♦ ♦ ♦

Alfred L. Lee, associated with Federated Metals Division, American Smelting & Refining Co., since 1940 and formerly connected with the New York sales office, has been appointed representative in the Philadelphia, southern New Jersey and eastern Pennsylvania areas. **Edward R. Bergin** recently joined the organization and will be sales representative in the metropolitan New York area. He formerly was with Chase Brass & Copper Co. and for the past year was a sales engineer for Peterson Steel Co. **Alfred Blackstone** will represent Federated Metals in North Carolina, South Carolina, the eastern portion of Georgia and all of Florida with the exception of the extreme western section.

♦ ♦ ♦

Everett M. Hicks has been elected vice president and director of Norton, Co., Worcester, Mass. He is manager of the company's Grinding Machine Division. Joining the company in 1937, he has been associated with the Grinding Machine Division since 1947 when he was appointed assistant manager, becoming manager in 1950. A graduate of Amherst College, Mr. Hicks is a member of the advisory committee of the Office of Price Stabilization and is a member of the government relations committee of the National Machine Tool Builders Association.

♦ ♦ ♦

Robert C. Sommer, until recently production assistant, Apex Smelting Co., Chicago, has been appointed a research assistant in the metals research department, Armour Research Foundation, Illinois Institute of Technology. A graduate of City College, New York, in 1949, Mr. Sommer has been production assistant at Apex since 1950.

♦ ♦ ♦

Leighton M. Long, Toledo, O., who set up the foundry and machine shop of Bushings Inc., Philadelphia, in 1945, has disposed of his entire interest in that organization. Mr. Long will now devote his entire time to consulting work in brass and bronze foundry practice.

♦ ♦ ♦

J. T. Bell, for the past 7 years a sales representative for Mid-West Abrasive Co., Owosso, Mich., has been named Detroit district manager, covering eastern Michigan and northwestern Ohio. **James J. Corcoran** has been named head of the company's customer service division. **G. Reagh Atkinson** and **D. F. McDonald** have been appointed service engineers for the company.

♦ ♦ ♦

Col. John Slezak, president, Turner Brass Works, Sycamore, Ill., has been elected chairman of the board of directors, Illinois Manufacturers' Association.

♦ ♦ ♦

Leon F. Miller, vice president in charge of sales and engineering, Machine Division, Osborn Mfg. Co., Cleveland, has been elected a direc-

(*Concluded on page* 128)

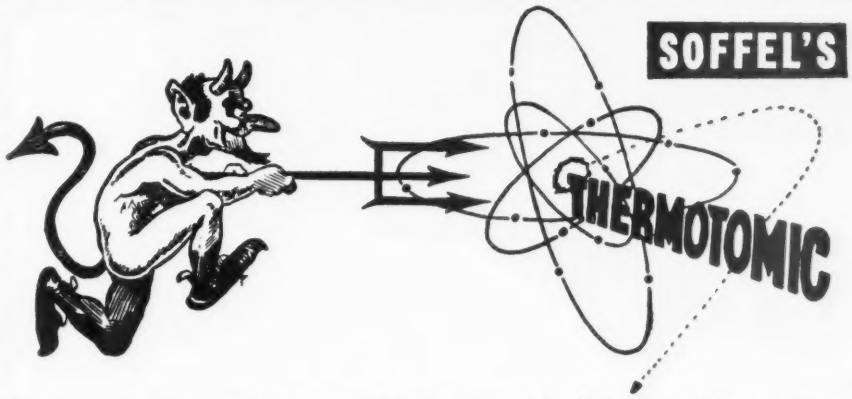
SOFFEL'S
New THERMOTOMIC-X
(Patented)

exothermic metal feeding compound

✓ CUTS CASTING COSTS

✓ MAKES BETTER CASTINGS

FOR STEEL, STAINLESS STEEL, GRAY OR NODULAR IRONS, COPPER, BRASS, BRONZE AND ALUMINUM



Riser feeding necks are reduced to one or two inch diameters.

Heads are knocked off without cutting or burning.

Eliminates shrinkage and piping in castings.

Thermotomic Compound is an exothermic material which is molded and baked into any desired shape just as sand cores are made. It produces a temperature of 3500° F. It is used as ring inserts under the risers or feeding heads, or as facing inserts where it is desirable to maintain the fluidity of the metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. Great savings are realized through reduced riser dimensions and cleaning costs. For use in green sand molds, use Thermotomic WP (waterproofed). Soffel's Carbon-Free Liquidizer No. 5 is recommended for use with Thermotomic feeding compounds on top of the feeding heads. Thermotomic ABC and AL-X31 Liquidizer are recommended for aluminum.

EXOTHERMIC CARBON FREE LIQUIDIZER

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is the leader in major foundries for use on ferrous and nonferrous metals, and in ingot production. It is the first and the original scientific non-carbon exothermic compound for feeding heads and risers.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER is different from ordinary head compounds in two ways: It is CARBON FREE, thereby eliminating carbon pick-up. It is EXOTHERMIC. Carbonaceous materials, regardless of their composition, will cause carbon pick-up, segregation, non-uniform grain structure and hard spots under risers and in castings. Carbonaceous materials contribute no added heat value or increased temperatures to the feeding metal and only act as an insulating cover.

SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. actually increasing the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. Shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms an insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads.

THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER

SOFFEL'S THERMOTOMIC HOTOP CARBON FREE LIQUIDIZER is for castings of iron and steel. A new exothermic compound which produces over 4000° F. of heat. It is used for dissolving and reducing skulls in ladles of iron and steel, also on the feeding heads and risers of castings and for ingot hot-topping.

SOFFEL'S THERMOTOMIC HOTOP will permit reducing feeding heads from 60 to 70% or the height as low as one-third the size of the diameter.

For ladle use when SOFFEL's THERMOTOMIC HOTOP is applied to cold, sluggish metal of iron or steel on the surface of the metal, the exothermic action of THERMOTOMIC HOTOP increases the temperature several hundred degrees and adds fluidity. It will save much metal which would have been discarded as scrap. THERMOTOMIC HOTOP is guaranteed not to change the chemical analysis of iron or steel, as it is carbon free and is recommended only for ferrous use.

Beware of Imitations: **We are the originators of Exothermic Carbon Free Liquidizers and Patented Thermotomic Compounds.**

PITTSBURGH METALS PURIFYING COMPANY

Manufacturers of Quality Fluxes and Purifiers for All Metals and Alloys

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

(*Concluded from page* 126)

tor of that organization. Mr. Miller joined the company in 1929. He was made sales engineer in 1935, sales manager in 1944 and was elected vice president in 1950.

♦ ♦ ♦

Fred P. Biggs, associated with American Brake Shoe Co., New York, since 1916, has been elected a vice president. Mr. Biggs is also president of the company's Brake Shoe & Castings Division. Prior to being named to that position in 1950, Mr. Biggs had been vice president in charge of sales for both Brake Shoe & Castings and Southern Wheel Divisions.

♦ ♦ ♦

Harold W. Newton has been appointed assistant sales manager of the Conveyor Division, Barber-Greene Co., Aurora, Ill.; and **William C. Gifford** has been named assistant manager in charge of machine sales. Mr. Newton for 13 years was engaged in conveyor design and engineering following graduation from the University of Cincinnati. He became associated with Barber-Greene in 1936 and was appointed manager of the company's engineered sales in 1942. Mr. Gifford is a graduate of the University of Illinois and also joined Barber-Greene in 1936. He has been sales office manager since 1950.

♦ ♦ ♦

August B. Hepp has been named chief engineer, Logan Co., Louisville, succeeding **H. R. Gotthardt** who, following retirement from active engineering duties with the conveyor manufacturing company, will remain as consulting engineer. Mr. Hepp joined the company 30 years ago and has been assistant chief engineer since 1944.

♦ ♦ ♦

John N. Moore has been appointed sales supervisor, Hooker Electrochemical Co., with headquarters in the Niagara Falls, N. Y., home office. Mr. Moore, associated with the company since 1941, was graduated from Wesleyan University and previously was engaged in sales and development work on Hooker Electrochemical Co.'s descaling salt and molten cleaner.

♦ ♦ ♦

T. F. Fleming has been appointed general manager, Morrison Engineering Corp., Cleveland, where he will head the metallurgical department. Mr. Fleming was associated with the company from 1936-38. More recently he was supervisor of the heat treating department, National Screw & Mfg. Co., Cleveland, and technical representative of the World Metallurgical Congress staff.

♦ ♦ ♦

Ben Kaufman has been named director of public relations, H. Kramer & Co., Chicago, with headquarters in Philadelphia, where he will assist in purchasing and executive work with the general manager of its Ajax Division there. Mr. Kaufman recently resigned as director of public relations for the National Association of Waste Material Dealers Inc., New York.

♦ ♦ ♦

Dennis E. Harvey has been appointed a vice president, Magnesium Co. of America, East Chicago, Ind., and will head the company's Washington office. **William Johansen,** formerly southwestern division manager, has been named sales manager with headquarters at East Chicago. **Charles J. Flutterer** succeeds Mr. Johansen in the company's Houston, Tex. office.

♦ ♦ ♦

Dr. C. J. Smithells, director of research, British Aluminum Co. LTD., Gerrards—Cross, Bucks., England, has been elected president of the British Institte of Metals. Newly elected vice presidents are: G. L. Bailey, director, British Non-Ferrous Metals Research Association, London; and Dr. S. F. Dorey, chief engineer surveyor, Lloyd's Register of Shipping, London.

♦ ♦ ♦

H. G. Hart, formerly of the Portsmouth, O., sales district, Harbison-Walker Refractories Co., Pittsburgh, has been transferred to the new specialties and retail department, Pittsburgh. **Floyd A. Pearce,** recently in the Pittsburgh sales district, succeeds Mr. Hart at Portsmouth. **E. A. Olson** replaces Mr. Pearce in Pittsburgh.

♦ ♦ ♦

G. V. Migula has been named manager of the western sales division, Hewitt-Robins Inc., succeeding **J. H. Hayden** who is retiring but will serve in an advisory capacity. **Marion D. Austin** is joining the western sales division as district manager of Hewitt Rubber Division. **K. L. Way** succeeds Mr. Austin as manager of hose sales and development at Buffalo.

♦ ♦ ♦

William Beiser has been re-elected president, Reliance Foundry Co., Cincinnati. **Frank E. Hutchinson** was re-elected vice president and **E. B. Mayer,** treasurer. **John C. Braun,** who has held the post of office and personnel manager, was elected secretary and assistant treasurer.

♦ ♦ ♦

Lou T. Lundstedt, on leave from Cleveland Hardware & Forge Co., Cleveland, has been appointed business analyst in the OPS Castings and Forgings Section, Office of Price Stabilization, Washington. He will assist on pricing problems in the field of forgings.

♦ ♦ ♦

Milton J. Weber recently was appointed vice president, procurement, for the Frank G. Hough Co., Libertyville, Ill., manufacturer of bulk material handling units.

FRED P. BIGGS
. . . Brake Shoe v. p.

HAROLD W. NEWTON
. . . conveyor sales

WILLIAM C. GIFFORD
. . . machine sales

AUGUST B. HEPP
. . . chief engineer, Logan Co.

NORTH of the border...it's Lectromelt, too!

for fast low-cost melting

Two Lectromelt* "M-T" furnaces give Canadian Tube & Steel Products, Limited, of Montreal laborsaving top charging that spells major economies in metals melting.

Canadian steel men have known Lectromelt for years—recognize that Lectromelt furnaces give you all these features:

- Top-charging design that saves man-hours, cuts electrode consumption, saves power, lengthens lining life.
- Counterbalanced electrode arms.
- Power supply and regulation equipment engineered for every installation.
- Separately mounted roof lift and swing mechanism.
- Side-mounted tilting mechanism.
- Completely factory-assembled and mechanically operated.

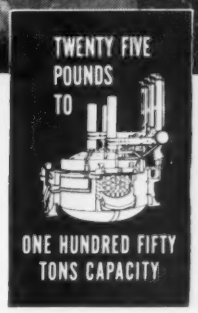
A furnace with all these features will cost a lot less in the long run. Pittsburgh Lectromelt Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



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Today's vital need, conservation of men and materials, calls for increased safety and efficiency. BAY STATE abrasive products for all snagging operations are "built" to meet such demands. They are rugged . . . fast-cutting . . . efficient . . . extra safe.

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MOUNTED POINTS

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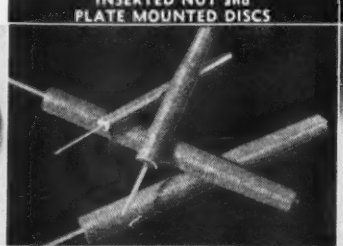


CORE FILES

CUP WHEELS • CONES

BAY STATE OFFERS A RUGGED LINE FOR STEPPED-UP PRODUCTION

WISCONSIN REGIONAL CONFERENCE

Covers Foundry Technical Developments

By EDWIN BREMER, ERLE F. ROSS
and ROBERT H. HERRMANN
FOUNDRY

KEYNOTE slogan—"The Foundry—the Place with a Future" —was aptly chosen for the fifteenth annual Wisconsin regional foundry conference in Milwaukee, Feb. 7-8. The meeting attracting close to 600 participants, demonstrated the keen interest of the industry in technological advancements. As in the past, the conference was sponsored jointly by the Wisconsin Chapter, AFS, and the University of Wisconsin.

Program followed the customary pattern of an opening general session, two luncheons, a banquet and 20 technical sessions. Of the technical meetings, four each were devoted to steel, gray iron, malleable iron, nonferrous and patterns.

George E. Tisdale, secretary-treasurer, Zenith Foundry Co., West Allis, Wis., and president of the Wisconsin Chapter, opened the conference and introduced Dean M. O. Withey, College of Engineering, University of Wisconsin, Madison, Wis., to make the welcoming address.

Dean Withey said that the need for engineers is not diminishing, and Wisconsin, like other universities, finds requests for graduating students exceed the supply. He recommended that engineering students be kept in college and not put in military service where engineering qualifications are not required. He also urged that qualified high school students consider engineering courses in college and engineering correspondence courses for those who can't afford college.

Kenneth Morse, director, Safety and Hygiene Committee, AFS, Chicago, also addressed the opening session. His presentation dealt with preventive maintenance as it deals with human resources, since manpower is of utmost importance to production. Among the problems which constitute hazards in industry and to which management must give attention, were enumerated as: Dust and silicosis, noise, vibration, gas, skin irritations, nuclear radiation, sanitation, temperature changes and accidents.

The speaker said control of these hazards is important because: It is just good business, insurance costs can be reduced, governmental regulations may be imposed, union pressure may become persistent, and community relations can be enhanced. Mr. Moore emphasized that the best standards for controlling occupational hazards come from industry itself.

At the Thursday luncheon, with J. G. Risney, Risney Foundry Equipment Co., Milwaukee, presiding, William W. Maloney, secretary-treasurer, AFS, Chicago, spoke briefly on the 1952 International Foundry Congress. He said that several hundred foreign visitors were expected, that all exhibit space has been sold, and that the convention and exhibition will be one of the greatest ever held by the society.

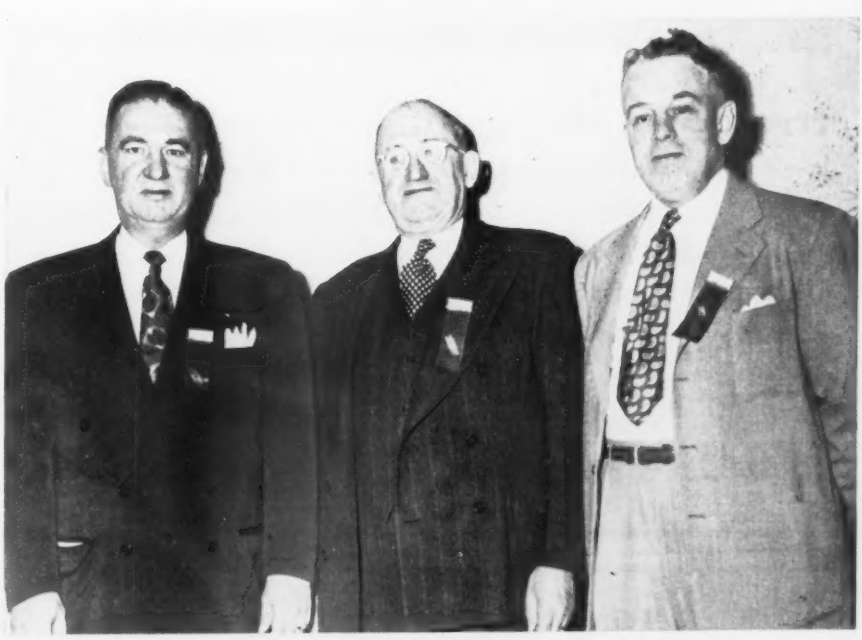
Frank G. Steinebach, editor, FOUNDRY, speaking on "Foundries in the Defense Effort," said that they have been doing a good job notwithstanding apparent reluctance of the military to standardize design and to specify which castings are desired first. Other hampering factors which prevent foundries doing the best possible work include laws which bar the defense administrations from securing services of experienced men from industry and from forming know-how industry groups to develop the best production procedures.

At the annual dinner Thursday night, presided over by George E. Tisdale, Frank Kirkpatrick, Milwaukee, pointed out that the present drift by the people and industry toward obtaining some type of security eventually will lead to state socialism since, in order to obtain security a good part of the control in lives and business has to be turned over to the government.

At the Friday luncheon, with A. F. Pfeiffer, Allis-Chalmers Mfg. Co., as chairman, Walter L. Seelbach, Superior Foundry Inc., Cleveland, and president, AFS, talked on "Know Your AFS." He described the numerous activities conducted in behalf of the membership, and pointed out that the benefits gained by members is in direct proportion to what they put into the society.

First of four nonferrous sessions was presided over by John L. Kammermeyer, Federated Metals division, American Smelting & Refining Co., Milwaukee, and John Bradisse, Waukesha Foundry Co., Waukesha, Wis. Speaker was Martin G. Dietl, Schaible Co., Cincinnati, who discussed the cleaning room. He described briefly the various types of cleaning equipment used as well as that for gate removal, and then enumerated methods for handling the castings. He

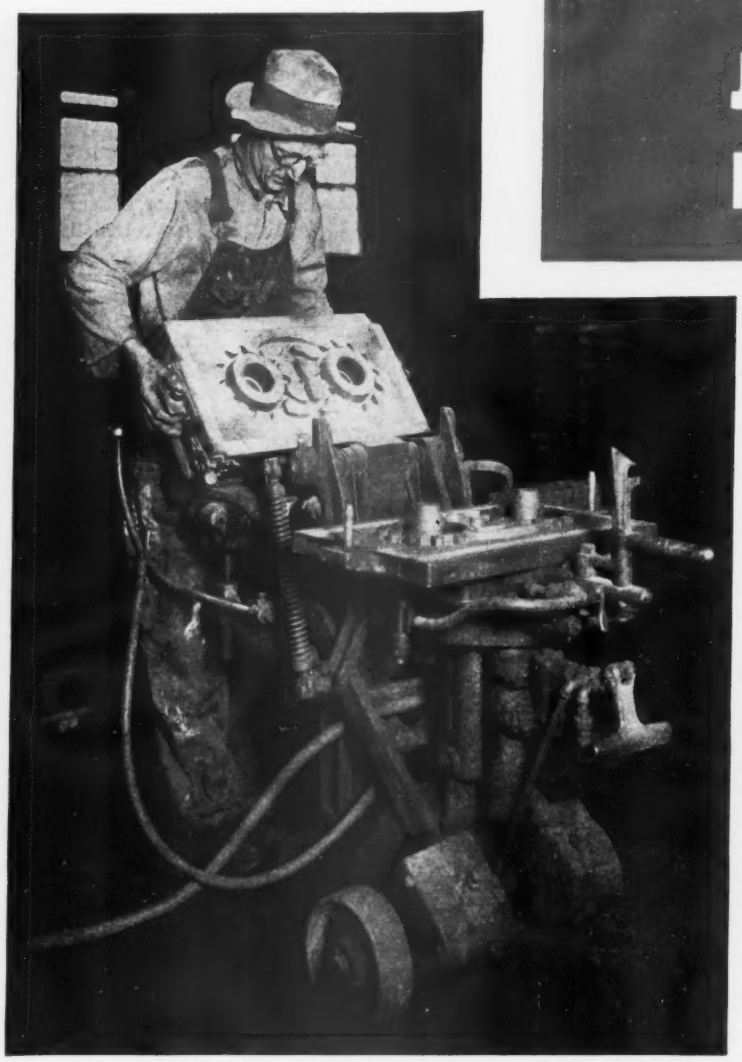
(*Continued on page* 134)

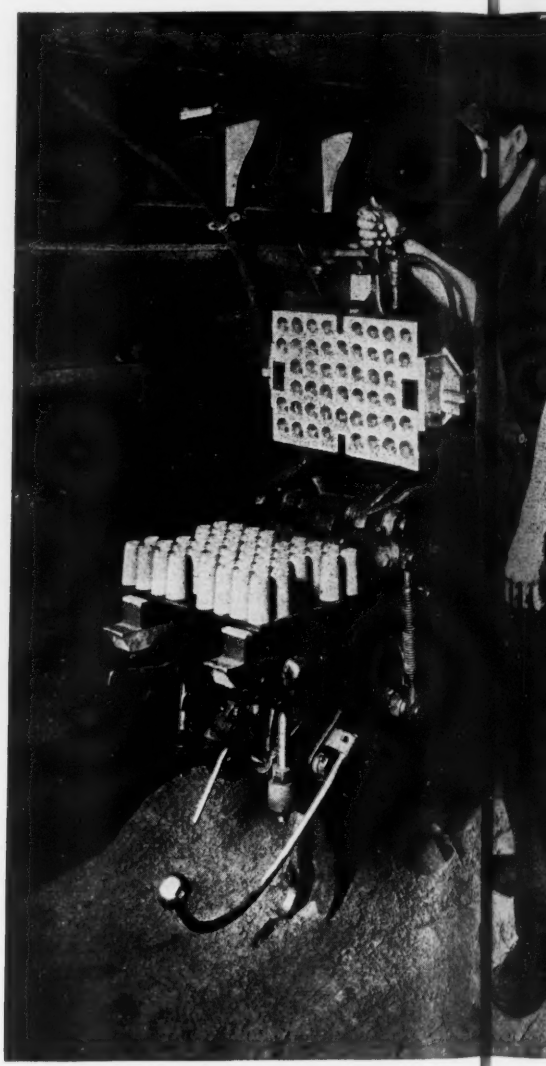


Wisconsin conference activities were directed by, left to right: Chapter President George E. Tisdale, Zenith Foundry Co.; A. F. Pfeiffer, Allis-Chalmers Mfg. Co., conference co-chairman, and Joseph G. Risney, Risney Foundry Equipment Co., Chairman. Conference photos by Walter V. Napp, Delta Oil Products

INTERNATIONAL TYPE R

Jolt Ram · H
Hand or Foo





TYPE RJ— Jolt Ram, Hand Turnover, Hand or Foot lever Draw Machine, is built in a wide range of sizes from 14" x 8" draw up to 20" x 12" draw.

The overall construction and design of the International RJ makes for convenient operation.

THE RJ MACHINE IS JUST ONE OF THE 90 STANDARD TYPES A

INTERNATIONAL MOLDI

LA GRANGE PAR

RJ MOLDING MACHINE

Hand Turnover
o Lever Draw

- Inquiries should specify outside width and length of the largest flask or core box to be handled and amount of draw required.
- The International **TYPE RJ** is designed, as are all of the machines in the line, by experienced foundry engineers who have a practical working knowledge of the problems of the business.
- The RJ is used extensively for cores.

YPES AND 1400 DIFFERENT SIZES IN THE INTERNATIONAL LINE

ING MACHINE COMPANY

PARK, ILLINOIS

(*Continued from page* 131)

pointed out that selection of equipment and handling methods should be based on type and quantity of castings produced, and would vary from foundry to foundry. Mr. Dietl concluded his talk with a short description of the mechanized cleaning room of his company.

Second nonferrous session on "Some Problems in a Nonferrous Pressure Casting Foundry" had for its speaker John W. Bolton, Lunkenheimer Co., Cincinnnati. Chairmen were C. Kotowicz, Ampco Metal Inc., and D. Bosma, Bucyrus-Erie Co., both of Milwaukee. Mr. Bolton stated that design of the casting can determine the ultimate possibilities in quality and economy, and stressed the necessity of co-operation between designer, foundryman, patternmaker and metallurgist.

Objectives in gating are high quality castings, low losses, economy of matchplate space, good yields and simple cut-off. Basic problem of gating is controlled cooling, and bar or feeder runners have been found quite effective. Sectioning, deep etching and fracturing are of considerable aid in establishing a good gating system. Melting furnace atmospheres should be based on gas analysis, and the metal should not be overheated.

Mr. Bolton said that in his foundry only one sand is used to produce castings from a fraction of an ounce in weight up to 450 lb. Sand is synthetic mix of 160 AFS grain fineness silica sand with western and southern bentonites, clay and small amounts of dextrin and resin binder. Moisture is held between 3½ and 4 per cent, and the sand shows 30 to 40 permeability, a green compression strength of 8 psi, and a deformation of 0.015 to 0.025-in.

Third nonferrous session related to metallurgical quality control in aluminum foundries, a was presided over by M. E. Ne , Wisconsin Centrifugal Foundry nc., Waukesha, and K. Jacobs, Stan rd Brass Works, Milwaukee. Speakers were Don LaVelle, Federated Metals Division, American Smelting & Refining Co., Whiting, Ind., and Tom Kramer, Wm. F. Jobbins Inc., Aurora, Ill.

Mr. LaVelle said that most difficulties experienced with aluminum alloys arise from the simplest operations. Lack of care in pouring, he believes, is responsible for the majority of defective castings. In pouring the lip of the crucible should be kept as close to the sprue opening as possible, and the sprue kept filled with a steady stream of metal. This prevents oxide skins being carried into the mold cavity, and decreases air entrapment in sprue and runner. Use of rectangular sprues also is preferable.

Mr. Kramer said that the best results in gating are obtained with the runner in the drag instead of the cope. He also stated that often it is desirable to employ several gates rather than one to eliminate trouble from hot spots caused by a large quantity of metal flowing over one area of sand. In speaking about test bars he indicated that soundest bars are obtained by using a U-shaped runner with the bars located perpendicular to the legs.

Closing nonferrous session constituted a panel discussion of various problems. Moderator was John Bradisse, Waukesha Foundry Co., and the panel experts were Walter W. Edens, Alloy Engineering & Casting Co., Champaign, Ill., and Messrs. Bolton and Kramer.

Questions referred to the panel covered a wide range of subjects. One, for example, related to a suitable core mixture for blowing cores, most suitable number of holes in the blowplate, and their location, etc. The panel pointed out that a satisfactory answer could not be given without more knowledge on size and type of corebox, etc. However, in general one could experiment with a 70 mesh sand, a small amount of cereal, about 60 to 1 sand to oil ratio, with some kerosene to provide additional lubricity. The tendency is to use larger and fewer blowplate holes to provide more uniform compaction of the sand in the corebox.

Another question was as to the possibility of using one molding sand for the production of nonferrous castings using 25 different alloys, and weighing from a few ounces up to 4000 lb. Consensus was that by extremely close control of sand and sand conditions, it would be possible to do so, but it would be preferable to make some modifications of a base sand for application with some of the alloys and the larger castings.

Lack Standard Radiographs

The panel was asked whether there are any standard radiographs for nonferrous alloys similar to those for steel. Reply was that as far as known, that there are not, as establishment of such standards is far more difficult due to the wide solidification range of the numerous alloys, varieties of porosity, etc. In discussing silicon bronzes or brasses, it was pointed out that they cover a wide range of compositions, and in general should be handled carefully in melting, since they are sensitive to presence of moisture, oil, etc., on the raw material.

At the opening steel session Charles W. Briggs, technical and research director, Steel Founders' Society, spoke on "Steel Foundry Cleaning Room Practices." V. E. Ziemer, Maynard Electric Steel Casting Co., Milwaukee, was chairman.

Mr. Briggs discussed the use of chipping hammers and flame washing and gouging tools in cleaning castings. He described tests made with chipping hammers in removing 7/16-in. high fins from a steel plate. An experienced operator removed metal at the rate of 20 lb per hr with a given hammer. The chisel was coated with a medium oil the operator removed 30 lb of metal per hour. With the chipper blade and the work oiled, metal was removed at the rate of 38 lb per hr. A further increase resulted when the hammer was turned diagonally to the work to give the blade a shearing action.

Mr. Briggs said that the flame washing process cannot replace the chipping tool for all types of metal removal. Removal of fins would take four times as long as with a chip-

(*Concluded on page* 136)

Harry Gravelin, Ford Motor Co., shown (with casting) during informal discussion after speaking before a gray iron session

Break the Aluminum

HEAT TREAT BOTTLENECK . . .

Specify:

ALMAG 35

***As Cast* PROPERTIES** ▶

MINIMUM		TYPICAL
35,000	TENSILE	40,000
19,000	YIELD	21,000
9.0	ELONGATION	13.0
60	BRINELL	70

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SUPPLIERS OF ALUMINUM TO FOUNDRIES, DIE CASTERS AND STEEL MILLS

(*Concluded from page* 134)

ping hammer because of the care required to avoid undercutting. However, flame washing is quicker and more effective in removing metal penetration type defects. Powder cutting is helpful in starting a cut for riser removal, particularly if sand is present on the riser, but is no faster than flame cutting in removing the riser after the cut is started.

In conclusion, Mr. Briggs discussed the use of carbon arc tools, utilizing either oxygen or compressed air to blow away or oxidize metal around the defect melted by the arc.

Where does pattern engineering fit into the Foundry Educational Foundation program? This was the question posed at the first pattern session, which featured George K. Dreher, executive director, FEF, Cleveland, as the speaker. Chairman was W. Kollmorgen, W. Kollmorgen Pattern Works, Milwaukee, and A. F. Pfeiffer, Allis-Chalmers Mfg. Co., was co-chairman.

Mr. Dreher asserted the pattern industry is going through a transition. At one time it was a craft; at present it is an engineering business; in the future it seems destined to become a science. Best part of a casting is its outermost ¼-in., thus it is desirable to remove the minimum amount of metal in machining. This requires closer dimensions in patterns.

Continuing, he said that probably most patterns now are made of metal, consequently the patternmaker is virtually in the toolmaker's field insofar as nature of work and dimensional accuracy are concerned. This trend is necessary for the castings industry to expand.

Most schools are dropping patternmaking courses as such, Mr. Dreher stated, but in their foundry courses are emphasizing the needs for good patterns. The schools are handicapped, however, because there isn't too much data for instructors to use. There is no good pattern handbook. The speaker asked—why not use a pattern kit? It is not likely that the schools will develop such a kit, thus making it a must for the foundry industry to do so. Pursuing this point, Mr. Dreher said schools can pick up obsolete pattern sets—automobile engines, for example—to use as kits. Some schools have done this.

Another point made by the speaker was that patternmakers should make use of engineers in their business, perhaps designating them as pattern engineers. These could give supervision in pattern design and production. Even pattern salesmen, Mr. Dreher contended, should have some knowledge of engineering.

First gray iron session was devoted to "Basic Cupola Operation," with John P. Holt, Basic Refractories Inc., Cleveland, as speaker. Harold W. Schwengel, Modern Equipment Co., Port Washington, Wis., served as chairman, and Harold Zuehlke, assistant foundry engineer, Allis-Chalmers Mfg. Co., Milwaukee, was co-chairman.

Only in the past two years or so have basic-lined cupolas assumed interest in the United States, although such units have been operating successfully in Europe for some years. At present 40 or more of these are in use here producing a variety of special products as well as ordinary gray iron and sufficient experience has been accumulated and correlated to provide guidance in operation. Purpose of the speaker was to set forth the principles and factors involved, and this he did in a brief yet complete manner. The presentation paralleled an article in FOUNDRY, December, 1951, authored by Mr. Holt although some new information has since become available.

"Quality Control in the Foundry" was the subject presented by George Verbeke, quality control engineer, John Deere Malleable Iron Works, East Moline, Ill., at the first malleable iron session. N. Amrheim, Federal Malleable Co., Milwaukee, was chairman of the session.

Experience of the speaker's plant with quality control methods since their inception six or seven years ago was outlined. The program was started for the purpose of measuring accurately the comparable qualities of products and methods designed to improve castings. Foremen and inspectors were given a 20-hr in-plant training course and first applications of the system were made in the coreroom. Ultimately the amount of scrap cores was reduced from 9.5 per cent to 1.5 per cent. The program then was expanded to the molding and pouring floors.

Use of statistical quality control has permitted focusing attention for improvement on the weakest spots and has been helpful in preventing serious trouble before it occurs. Control charts have been posted in the shop near each job they cover and have been factors in making employees conscious of quality. Furthermore, an improved spirit of cooperation has been noted between workmen, foremen and departments.

In conclusion, the speaker pointed out that quality control never corrects anything. It merely presents an unbiased picture of process quality. A satisfactory operation or the need for improvement can be seen at a glance.

(*To be concluded next month*)

Visitors at the conference included Wm. J. Grede, Grede Foundries Inc. (left); Walter L. Seelbach, national AFS president (center), shown here with Wisconsin Chapter President George E. Tisdale

Three Firms Earn Award For Good Management

Doehler-Jarvis Corp. and American Brake Shoe Co., New York, and United Engineering & Foundry Co., Pittsburgh, have been awarded certificates of management excellence for 1951 by the American Institute of Management, New York. The award is based on credits for excellence in economic function, corporate structure, health of earnings growth, fairness to stockholders, research and development, directorate analysis, fiscal policies, production efficiency, sales vigor, and executive evaluation. To be certified, a company must receive 7500 points out of a possible 10,000. The point system used by the organization is based on a continuing comparative study of 3000 concerns.

According to Jackson Martindell, AIM president, only 298 firms in the United States and Canada were eligible for the designation. This is an increase of 70 over a year ago.

A RUGGED MILL FOR A TOUGH JOB

Typical 36″ x 72″ Whiting Tumbler with direct-coupled drive and gearmotor with built-in brake

Experience has taught us the importance of rugged construction when it comes to a tumbling mill. Heavy plate shell, roller bearings, steel trunnions, proper alignment of barrel, smooth meshing gears, reinforced tight-fitting door—all these are important features of Whiting design that insure long life and low-cost operation.

Standard sizes: 24″, 30″, 36″, 42″, and 48″ diameter—in lengths from 36″ up. Special designs for special needs. Various types of direct drive, also line drive when desired.

Bulletin FY-123R gives full details, or ask the Whiting sales office nearest you.

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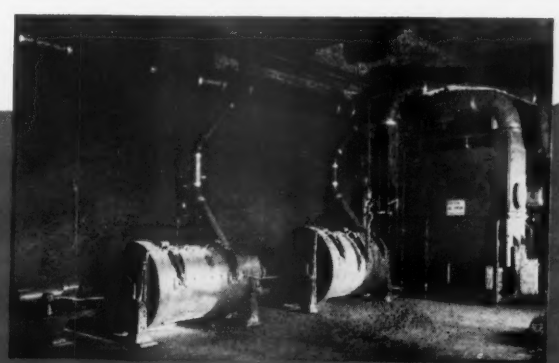
Offices in Chicago, Cincinnati, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Representatives in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

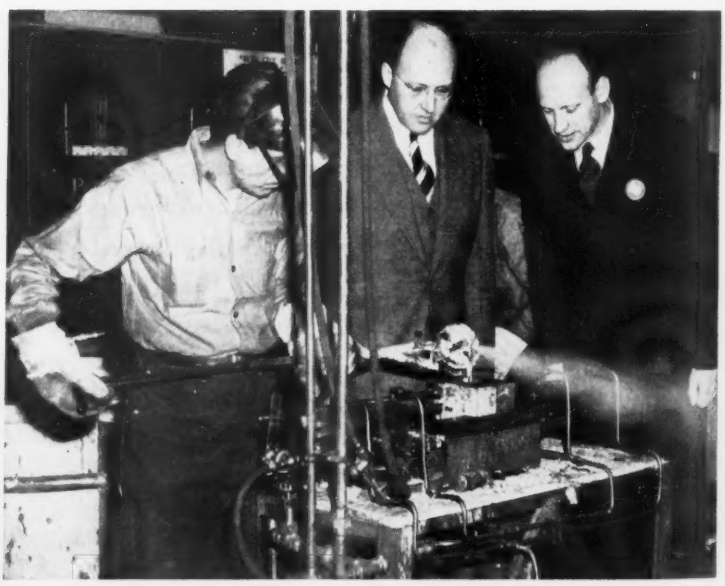


These two Whiting Tumbling Mills are served by a Hydro-Clone Dust Suppressor

NEWS VIEWS

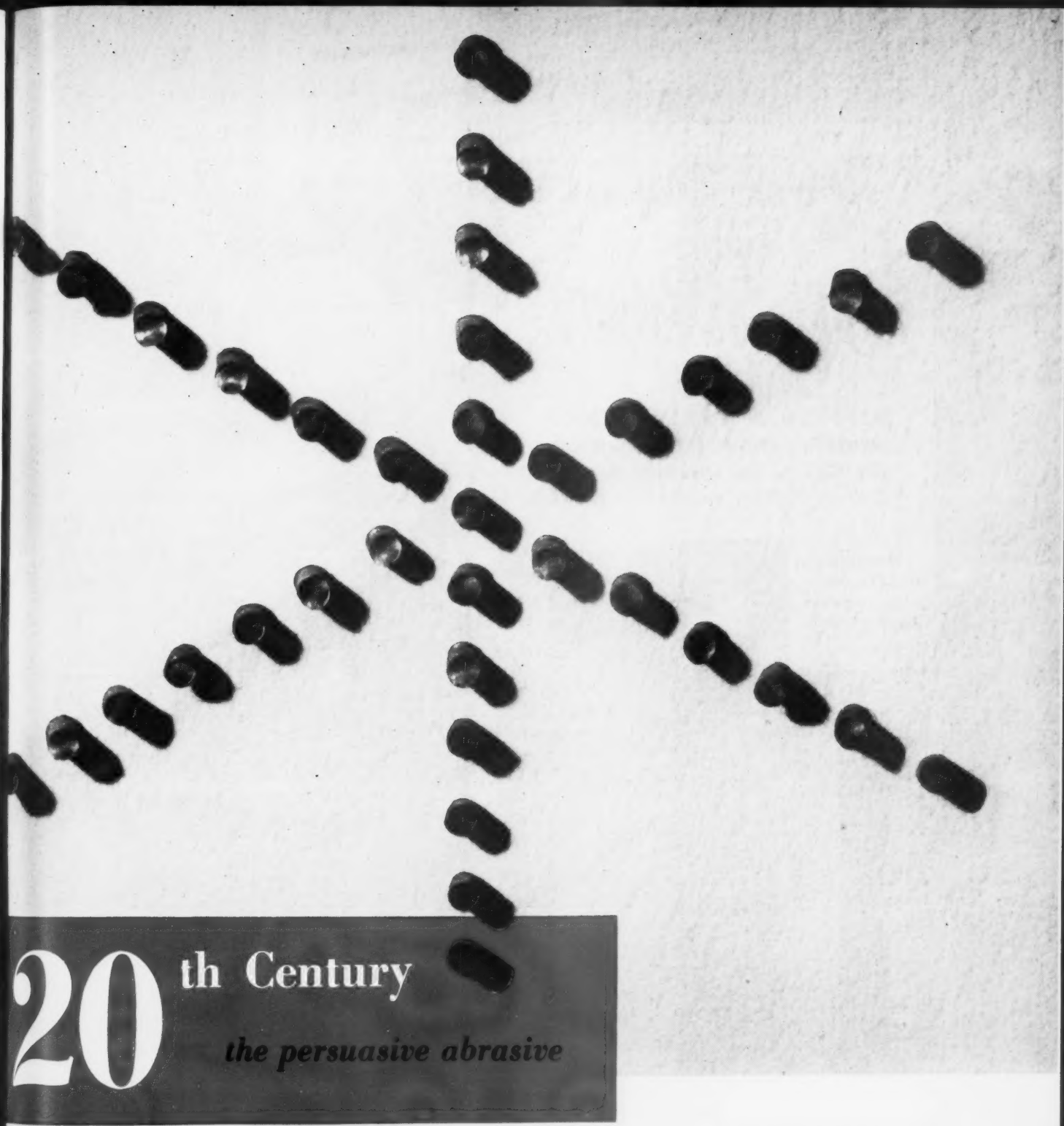
▲ **ANNIVERSARY:** To observe their 25th anniversary with the Buckeye Products Co., Cincinnati manufacturer of foundry facings and supplies, President Arthur Hoffheimer recently presented wrist watches to Goble Russell (right), shop superintendent, and Carl Teschner (left), machinist. Mr. Hoffheimer also is a 25-year man with the company.

▲ **NO. 14,000:** Harnischfeger Corp., Milwaukee, recently completed the 14,000th heavy duty crane it has built since 1889. It goes to the Pontiac Motor Division of General Motors. Pointing to the serial number is T. W. Bradford, Pontiac plant engineer. Looking on are Henry Harnischfeger (left), vice president, and Herman Menck, vice president in charge of manufacturing at Harnischfeger. In addition to the heavy duty type, the company also has built more than 4000 cranes for intermediate service.



▲ **BI-METALLIC:** Alan H. Chamberlain (right), technical director of Rolloy Piston Co. Pty. Ltd., Port Melbourne, Australia, with M. V. Little, assistant general manager, Al-Fin Division, Fairchild Engine & Airplane Corp., watches as a workman fills a mold in the Al-Fin foundry, Farmingdale, N. Y. The finished piece will be a bi-metallic part in which the aluminum is molecularly bonded to steel. Mr. Chamberlain's company has obtained Australian rights to the patented process.

← **FERROALLOYS:** When completed in 1953, Electro Metallurgical Co.'s $100 million ferroalloy plant at Marietta, O., will be the world's largest, employing 24 large electric furnaces. Principal products will be alloys of chromium, manganese and silicon. Here, molten ferroalloy tapped from a furnace into a ladle is being poured into chills.



20th Century

the persuasive abrasive

Any reference to 20th Century Drawn Steel Shot will emphasize its highest quality, economy and ability to stand hard use.

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Howell Works: Howell, Michigan

One Of The World's Largest Producers Of Quality Abrasives
Normalized (Copyrighted Trade Name) – Hard Iron – Cut Wire – Powder

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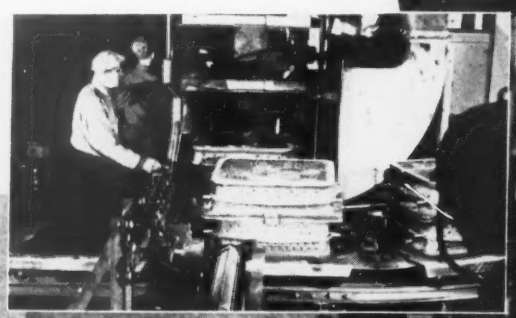
COMPLETE FOUNDRY ENGINEERING SERVICE



HIGH SPEED MOULDING SYSTEM at J. I. CASE CO. Bettendorf, Iowa

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1949	713,330	371,214	.....
1950			
Nov.	85,163	48,670	180,099
11 mo.	828,992	461,101	.....
Dec.	91,510	51,091	194,950
Total	920,502	512,192	.....
1951			
Jan.	92,508	54,817	234,060
Feb.	88,950	54,915	255,347
Mar.	101,667	60,265	267,169
Apr.	97,276	57,554	276,463
May	100,800	61,373	274,954
June	94,376	57,176	258,144
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
11 mo.	1,007,500	608,837	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[2]
1949	304,409	106,825	102,908	87,812	.....
1950					
Nov.	46,816	16,099	14,040	15,715	67,931
11 mo.	406,638	138,365	128,769	130,239	.....
Dec.	45,999	15,675	15,052	14,322	104,380
Total	452,637	154,140	143,821	144,661	.....
1951					
Jan.	42,538	14,401	14,554	12,641	93,264
Feb.	40,785	14,106	13,082	12,852	94,581
Mar.	42,204	15,900	12,771	12,677	100,453
Apr.	40,242	14,455	12,901	12,079	106,077
May	40,487	14,798	13,400	11,892	112,638
June	35,961	13,853	10,323	10,850	112,760
July	27,426	10,739	7,142	8,693	119,461
Aug.	35,531	14,128	10,922	9,526	117,888
Sept.	32,487	13,086	8,829	9,730	122,973
Oct.	35,222	13,950	10,131	10,297	110,382
Nov.	32,367	12,728	8,816	9,926	116,044
11 mo.	405,250	152,144	122,871	120,963	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[2]
1949	724,053	654,444	37,311	.....
1950				
Nov.	103,694	93,607	5,776	67,931
11 mo.	921,650	834,889	46,771	.....
Dec.	100,548	90,513	5,985	69,569
Total	1,022,198	925,402	52,756	.....
1951				
Jan.	102,643	92,171	6,363	77,580
Feb.	96,946	87,667	5,427	75,967
Mar.	110,887	100,221	6,405	79,766
Apr.	101,506	91,852	5,802	82,711
May	105,438	95,049	5,986	84,002
June	98,559	88,818	5,358	83,518
July	76,551	69,334	4,064	85,837
Aug.	94,443	84,720	5,097	84,821
Sept.	85,433	76,304	5,161	84,611
Oct.	94,706	84,544	5,845	82,491
Nov.	87,764	78,640	5,661	82,667
11 mo.	1,054,876	949,320	61,169	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1949	9,364	8,781	....
1950			
Nov.	1,508	1,434	6,928
11 mo.	10,786	10,138	....
Dec.	1,528	1,444	6,958
Total	12,314	11,582	....
1951			
Jan.	1,840	1,739	8,616
Feb.	1,907	1,801	10,878
Mar.	2,156	2,058	12,196
Apr.	2,267	2,161	12,191
May	2,334	2,206	12,867
June	1,758	1,642	14,331
July	1,676	1,557	15,528
Aug.	2,270	2,135	16,095
Sept.	2,010	1,931	16,407
Oct.	2,371	2,300	16,143
Nov.	2,774	2,461	15,550
11 mo.	23,363	21,991	....

Foundry Production Workers

Estimated Number

	Nov. 1951	Oct. 1951	Nov. 1950
Gray Iron	154,700	153,100	157,300
Malleable	27,900	28,000	25,100
Steel	65,900	65,300	52,900
Nonferrous	88,100	88,900	91,800

Average Weekly Earnings

Gray Iron	$69.55	$69.89	$69.22
Malleable Iron	70.74	71.64	69.15
Steel	75.27	75.98	69.50
Nonferrous	74.35	75.43	74.97

Average Weekly Hours

Gray Iron	41.4	41.7	43.4
Malleable Iron	40.4	41.1	42.4
Steel	42.5	42.9	42.3
Nonferrous	41.4	42.0	42.5

Labor Turnover Rate (Oct.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	5.5	4.7	3.1	0.8
Malleable Iron	4.6	5.7	4.0	0.7
Steel	6.9	5.6	4.1	0.3
Nonferrous	4.7	5.9	2.9	1.8

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

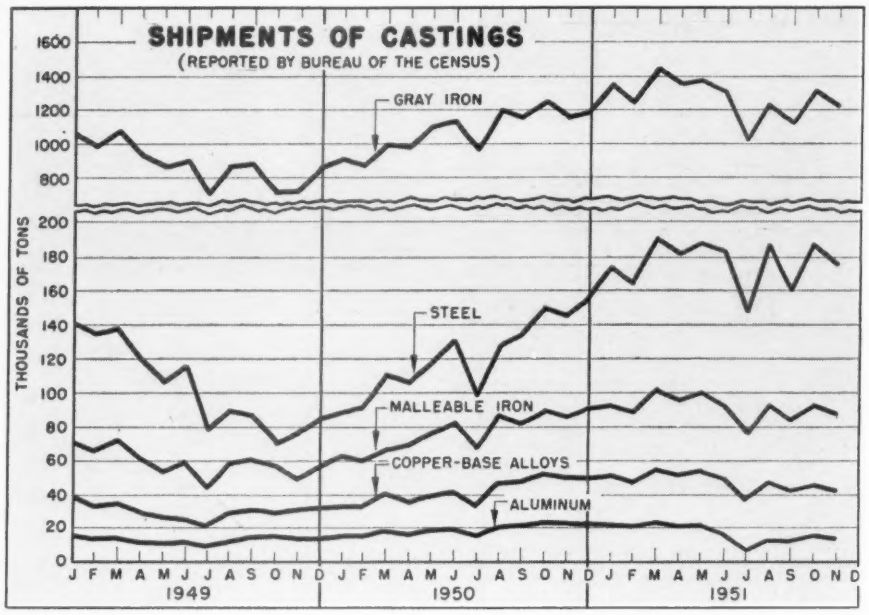
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings—Total[3]	Soil Pipe & Fittings—Total[3]	Unfilled Orders[2] Total
1949	10,549,284	5,521,441	6,624,420	2,675,411	1,776,242	759,860	555,569	493,117	1,029,743	563,310	.....
1950											
Nov.	1,160,770	656,745	733,570	343,073	194,271	85,057	44,382	40,068	115,465	73,082	1,930,176
11 mo.	11,723,588	6,227,423	7,371,982	3,082,248	2,097,961	945,519	470,407	416,418	1,092,696	690,542	.....
Dec.	1,181,974	652,929	745,766	333,033	210,700	98,071	43,667	39,984	111,066	70,775	2,012,480
Total	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Jan.	1,364,311	762,407	875,437	405,863	228,824	103,475	56,046	49,065	131,779	72,225	2,297,705
Feb.	1,234,226	684,928	811,724	369,932	193,648	91,598	49,423	43,967	117,141	62,290	2,391,843
Mar.	1,440,149	818,473	920,802	427,162	231,853	114,858	62,282	57,241	144,620	74,592	2,389,659
Apr.	1,363,041	766,735	880,381	403,619	217,970	106,417	61,993	54,002	134,302	68,395	2,336,926
May	1,396,236	796,053	897,913	418,950	225,129	112,145	65,721	57,485	139,854	67,619	2,228,596
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
11 mo.	13,954,897	7,866,901	8,925,218	4,160,373	2,419,606	1,162,685	592,402	525,153	1,365,343	667,825	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1949	1,250,460	865,297	232,976	944,232	659,454	223,310	299,270	205,843	9,666	.....
1950										
Nov.	145,929	108,263	30,775	110,476	84,316	29,245	35,453	23,947	1,530	537,666
11 mo.	1,308,753	930,589	226,579	964,646	700,908	210,303	344,107	230,681	17,366	.....
Dec.	155,258	113,692	34,061	118,744	88,552	32,160	36,514	25,140	1,901	554,187
Total	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Jan.	174,056	124,002	42,805	135,086	98,197	37,790	38,970	25,805	5,015	675,385
Feb.	163,976	117,156	42,565	126,293	93,461	36,793	37,683	23,695	5,772	706,989
Mar.	190,665	134,184	44,196	148,884	107,745	39,492	41,781	26,439	4,744	779,717
Apr.	181,908	129,059	41,545	139,948	102,367	37,553	41,960	26,692	3,992	846,947
May	189,232	131,102	39,845	143,201	101,363	35,511	46,031	29,739	4,334	881,702
June	184,424	131,219	42,337	141,538	103,090	38,200	42,886	28,129	4,137	895,054
July	147,251	100,141	27,585	111,964	78,034	24,516	35,287	22,107	3,069	929,978
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept.	160,695	116,658	35,500	120,632	89,771	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
11 mo.	1,935,860	1,383,731	443,159	1,463,612	1,073,389	386,614	472,347	310,342	46,585	.....

[1] Source: Bureau of the Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1950	1951
Jan.	159.3	668.0
Feb.	113.1	638.6
Mar.	225.2	599.0
Apr.	160.6	490.1
May	294.9	431.7
June	622.7	393.2
July	401.8	390.3
Aug.	693.6	404.5
Sept.	483.8	346.5
Oct.	526.8	372.4
Nov.	885.5	305.5
December	526.2	230.5

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1949	63,637,429	63,462,233	2,778,868
1950			
Nov.	6,243,970	6,131,733	317,120
11 mo.	65,391,205	66,244,308	3,014,059
Dec.	6,606,464	6,590,823	323,458
Total	71,997,669	72,835,131	3,337,517
1951			
Jan.	6,791,828	6,766,767	330,698
Feb.	6,001,538	6,036,774	293,169
Mar.	6,692,460	6,693,661	299,190
Apr.	6,484,258	6,354,400	356,816
May	6,747,163	6,732,825	368,511
June	6,574,621	6,645,155	330,920
July	6,636,335	6,502,058	301,125
Aug.	6,777,820	6,679,152	303,664
Sept.	6,468,080	6,364,628	272,402
Oct.	6,733,876	6,719,087	292,654
Nov.	6,478,523	6,545,686	271,649
11 mo.	72,386,502	72,040,193	3,420,798

Ingot Brass and Bronze

(Shipments in net tons)

	1950	1951
Mar.	22,494	31,997
Apr.	22,118	30,472
May	23,643	33,267
June	25,093	33,817
July	21,609	32,016
Aug.	29,689	25,285
Sept.	28,811	22,285
Oct.	32,240	23,124
Nov.	31,748	23,544
Dec.	28,757	20,987
Total for year	303,563	332,378

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1949	377,779	248,679	.....
1950			
11 mo.	488,580	310,672	.....
Total	536,398	341,833	.....
1951			
June	41,341	28,278	95,174
July	34,064	23,088	85,028
Aug.	37,321	22,985	80,588
Sept.	31,507	20,021	81,539
Oct.	36,565	22,608	76,589
Nov.	30,531	19,219	81,955
11 mo.	423,377	274,768	.....

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1949	49,281,000	22,922,000	7,968,000	4,175,000	801,000	276,000	4,239,000	2,608,000
1950								
Nov.	5,293,000	2,598,000	841,000	431,000	107,000	39,000	593,000	364,000
11 mo.	56,136,000	26,803,000	8,671,000	4,348,000	996,000	363,000	5,775,000	3,367,000
Dec.	5,361,000	2,600,000	803,000	418,000	122,000	44,000	600,000	361,000
12 mo.	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Jan.	5,975,382	3,010,300	1,009,142	533,705	110,004	41,116	684,484	435,633
Feb.	5,337,562	2,691,692	936,918	492,395	101,233	38,135	627,308	398,814
Mar.	6,187,520	3,100,622	1,064,325	558,833	108,513	39,260	728,786	463,371
Apr.	5,987,947	3,013,527	1,029,069	545,897	103,458	37,973	704,416	457,521
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,688
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
11 mo.	63,035,119	31,165,895	10,352,457	5,480,401	1,115,992	408,669	7,704,360	4,938,850

Pig Iron Production and Consumption

	Production**—Total	Production**—Foundry	Production**—Malleable	Production**—Basic	Production**—Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Total	Consumption*—Cupola	Consumption*—Air	Consumption*—Electric
	(Standard grades—1000 net tons)					(By type of furnace, 1000 gross tons)			
1949	53,408.7	2,821.9	2,294.5	41,312.5	6,979.8	47,928	4,510	235	96
1950									
Dec.	5,609.2	264.9	260.2	4,374.4	709.8	5,068	456	34	15
12 Mo.	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Jan.	5,801.7	300.0	233.3	4,529.8	738.6	5,367	542	32	11
Feb.	5,084.8	238.7	226.0	4,007.2	612.9	4,725	492	29	10
Mar.	5,919.3	267.9	276.5	4,647.5	727.5	5,406	550	33	15
Apr.	5,812.2	259.1	261.0	4,575.8	716.1	5,281	516	31	11
May	6,104.9	282.0	259.4	4,777.0	786.5	5,522	533	31	11
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	254.4	4,723.3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	....	...	...	...
12 mo.	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	....	...	...	...

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

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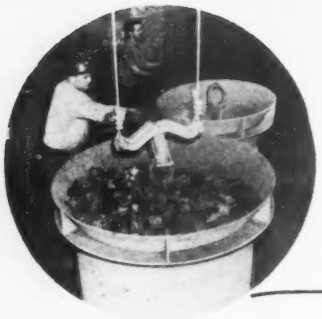

Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Indianapolis

Starting a new series of articles dealing with cupola operation, the author discusses the effect of variations in quantity and quality of pig iron. Subsequent articles will cover the influence of scrap, fuel, fluxing, patching and equipment

IN spite of the tremendous technological advances made in the gray iron industry the past two decades there still remains a factor of considerable concern and worry in connection with cupola melting. This is the variation in quality and quantity of the raw materials due to fluctuating market conditions.

A recent series of articles (January 1951 through January 1952) discussed in some detail the fundamental factors involved in cupola operation and control, but obviously such a summary could not present the material in the more practical combination of effects encountered in actual practice. The present series, therefore, will attempt to point out the required adjustments necessary to compensate for poorer quality of certain raw materials, and additionally the corrections required when certain basic materials are in short supply.

It has previously been pointed out that no single fundamental factor in cupola operation functions in a complete and independent manner; each one influences or is influenced by one or more other factors. For example, a change in the cast iron scrap from a normal satisfactory size to an aggregate smaller size cannot be made without some adjustment in several of the other controlling factors. The stock density will go up, melting rate and metal temperatures may drop, and oxidation may occur in the metal. Or again, possibly the coke size has dropped. We may then expect lower temperatures, lower melting rates and lower carbon in the metal.

The above two illustrations are by no means the only difficulties encountered in recent years nor are they necessarily the principal ones. They are simply quoted to show that a change in one factor may produce several important changes in operation which can have a serious effect on the quality and the cost of the iron poured.

The principal factors we will discuss are:

1. Pig iron. 2. Scrap. 3. Fuel. 4. Fluxing. 5. Equipment.

We are all well aware that even when we had a choice of excellent materials the cupola was not free from difficulty. This calls our attention to the fact that inherent factors exist which will produce poor iron even with good materials. Obviously, therefore, if our raw materials are poor we must initially correct operating or equipment errors in order to produce a satisfactory commercial metal.

It will be apparent, as this discussion advances, that all factors are not necessarily involved in any one operation, and therefore they all may not require adjustment, but at the same time we should not arbitrarily select one factor as being the sole or principal cause of some difficulty to the exclusion of considering the effect of the other related factors.

Effect of Pig Iron on Metal Characteristics—In almost all instances pig iron constitutes some part of the metal mixture charged in the cupola, and pig iron is the only virgin metal used. With the unavailability of charcoal pig this discussion will be confined to pig iron produced from coke.

Probably the most significant attribute of pig iron in a mixture is reflected in the ofttimes repeated question, "What is the minimum amount of pig iron which can be used without rendering the final iron unacceptable?" The question itself indicates the general conviction that pig iron must be present in some amount to preserve the quality of the metal, and this is correct for most gray iron.

It has long been established that the chemical analysis of a metal is not its sole criterion of quality, and for this reason physical and structural properties are also determined. The "historical" influence of certain metals in the charge is still a subject of much debate, but we do know that certain influences are present and defy chemical identification. Pig iron frequently occupies this role.

One of the principal reasons and advantages of pig iron in a mix is because of its high inherent carbon content. When pig iron is in short supply and must be replaced by cast iron scrap one of the first items of concern is the lowered carbon content of the final metal.

Normal pig iron used for cupola mixes will range in carbon content from 3.40 to 4.70 per cent. It is quite obvious, therefore, that this material offers the most positive method of carbon addition to any mix and also will account for the difficulty encountered when, because of supply, the pig iron content must be reduced in the mix.

Because of its initial high carbon content and its virgin state a high pig iron content mix will absorb poorer scrap (within limits, of course) in the mix than could otherwise be used.

Pig iron has another advantage in a mix due to its regularity of size and composition, namely, uniform melting.

Compensating for Limited Pig Iron Supply—When pig iron is in short supply and it is necessary to reduce its percentage in the mix the usual practice is to gradually reduce the amount used over a several weeks period, making the compensating adjustments gradually. In this manner the first effects of the reduction may not be felt. When the reduction continues, however, the carbon content begins to lower and the iron to "stiffen" up on pouring. Additionally, machining of the castings becomes more difficult and shrinkage increases. When these conditions are encountered the critical minimum level of pig iron content generally has been exceeded.

There is a direct relationship between the minimum amount of pig iron in the mix and the character of the scrap used. In other words, the better the purchased scrap employed the lower can be the pig iron content, and conversely, the poorer the scrap used the higher must be the pig iron content.

This same relationship exists between pig iron content of the mix and state of oxidation within the cupola.

(*Continued on page* 148)

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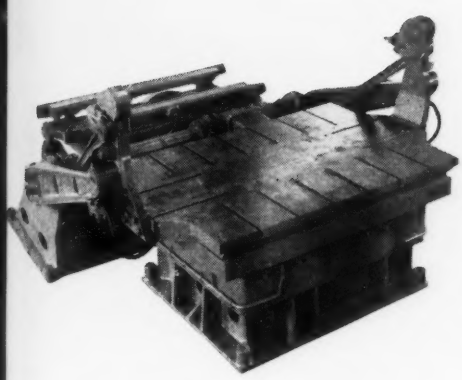

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Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

(*Continued from page* 144)

If the operation of the cupola is well balanced (coke and air) we can use less pig iron and still produce a good metal.

We therefore have a three-way relationship between the minimum pig iron content of the mix, the character of the scrap purchased and the mode of operating the cupola.

One factor frequently overlooked in this problem, but associated with it, is the influence of the returns on the metal. To illustrate—assuming that we are, of necessity, gradually reducing the pig iron in the mix, and that the iron is also gradually approaching a poorer condition, obviously the returns speed up the process of contamination. This fact must be taken into consideration in correcting conditions.

So far we have been discussing the effect of limited pig iron as it relates to the final carbon or state of oxidation of the metal, but additionally we should consider the parallel effect on sulphur content. Here again the results are multiple. With a reduction in pig iron, the scrap content with a higher sulphur level goes up, raising the level in the final metal, which in turn increases the sulphur in the returns. Automatically, therefore, a higher sulphur level is established through the system.

Minimum Pig Iron Content

The problem with respect to silicon and manganese as affected by less pig iron is easily compensated for by the use of ferrosilicon or silvery pig or ferromanganese.

This review points to the corrective measures necessary when the pig iron content is so low that the final iron is too critical or sensitive. For average gray iron this minimum level of pig iron has been found to be 20 to 25 per cent.

The first move should be to improve the type of cast iron scrap purchased. If this already has reached the optimum quality obtainable, then the plant should improve the quality by sorting as the iron is charged. All burned or hard iron should be removed. Additionally and for all operations, no nonferrous metal, particularly aluminum, should be charged.

All steel in the cast iron scrap should be accounted for. Very frequently (particularly today) an appreciable amount of steel is contained in the scrap which, of course, will automatically lower the out-going carbon. For example, if the steel content of the cast iron scrap were 10 per cent, this would account for a loss of 10 points of carbon in a normal charge, which under critical conditions could be serious. If the scheduled mix does not require steel, this should be removed from the scrap, but if the charge contains a scheduled amount of steel, then this extra amount in the scrap should be allowed for.

Small, badly rusted scrap will also depress carbon absorption so that this material should be avoided.

Borings, even when briquetted, are responsible for lower carbon absorption and high silicon losses, and this material should be reduced to a minimum or eliminated entirely during periods of low pig iron availability.

Compensate for Low Carbon

To compensate for low carbon in the mix due to low pig content certain materials have been used with varying degrees of success. Among those most frequently used are these:

Calcined Pitch Coke—This is a high-carbon material prepared by calcining or roasting pitch coke. In the roasting the residual oily or tarry material is driven off, leaving almost pure carbon in a highly graphitic state. This material is charged with the coke, the amount used depending on the particular requirements.

Petroleum Coke—While this material has been in decreasing supply it is still used to some extent to bolster carbon availability. Generally it is very oily with extreme variations in size. It does enrich the carbon availability to a certain extent, but its rapid combustion results in only a minor degree of carbon absorption. A disadvantage is its variable sulphur content which should be carefully determined before using.

Graphite Electrodes—This material is broken to a size to permit charging. Although high in graphite content, the absorption of carbon was generally not sufficient to warrant its use.

Graphite Briquets—This is a material prepared specifically for carbon absorption by cupola metal.

Mention has previously been made of the effect of certain types of scrap which are always injurious to the metal and the increased necessity for their removal when pig iron must be reduced in the charge. For the most part these materials tend to increase the state of oxidation of the metal largely by contamination. We have also mentioned that poor combustion within the cupola will produce the same effect and therefore it is logical that the cupola operation should also be adjusted to optimum conditions.

Previous articles have clearly indicated how easily an operation can be upset by an improper relationship between the air and the coke.

It has been well established that the two principal elements of cast iron, carbon and silicon, are both extremely sensitive to loss by oxidation. Since these elements also largely describe or embrace the features of individual irons it is obvious that any factor upsetting either their solubility or ultimate level will also affect the desired quality of the metal. For this reason we must be concerned with the manner we operate the cupola particularly with respect to the balance established between the coke and the air.

We have already shown that the average coke can be burned under an extreme range of available air with a resultant variation in the amount of heat released. Simultaneously and directly related to our problem is the fact that after we have reached the midpoint of the range of coke combustion the amount of heat released increases but also the state of oxidation increases rapidly. In terms of the cupola, when pig iron is short this means that we should be less interested in fuel economy and more interested in conserving the carbon in the charge. This is done by running under an "over-coked" condition to favor the "reduction" reaction.

Increase Amount of Coke

Operating under "reducing" conditions is accomplished by one of two means. First, and the most obvious, is increasing the amount of coke per charge while leaving the air input constant. While this procedure is practical and the usual one followed, it has several serious disadvantages and, in fact, is not the correct manner. Increasing the coke can reduce oxidation without necessarily reducing metal temperature, but it will definitely slow down melting rates and increase fuel costs. When fuel is in short supply this adds a further difficulty.

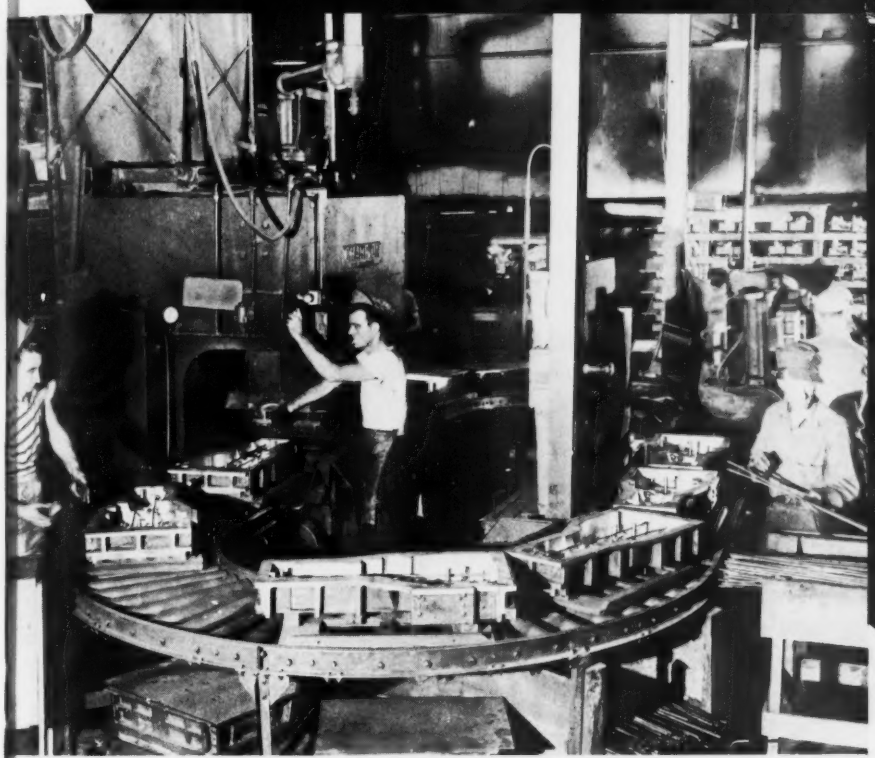
The second method, and much the more desirable, is to establish better combustion within the cupola. This is accomplished with minimum expenditure, maximum economy and maximum control. The first move in this direction is to screen the coke for the removal of the fines. A screen not less than 2½ in. should be used for this purpose. In most instances this will remove about 5 to 7 per cent of the total coke, but simultaneously can permit a reduction of 15 to 20 per cent of the coke charged, with improved carbon absorption, metal temperatures and faster melting rates.

With properly sized coke maximum combustion efficiency can be obtained when patching practice (and fluxing) minimizes bridging and the tuyere area has been adjusted for

(*Concluded on page* 153)

from the smallest...

A Champion CB-5 Core Blower in operation at General Malleable Corp., Waukesha, Wisconsin. The special stacking feet on the core dryers combined with the high production of the CB-5 permit maximum efficiency on this job . . . the blowing of port cores for diesel engine blocks.



to the LARGEST

At the Golden Foundry Company, Columbus, Indiana, up to 180 large half-barrel cores are blown each hour on this high production coremaking unit with a Champion CB-400 Core Blower. Core boxes are rolled over on the Johnston and Jennings 612 Rollover Draw machine in the loop at the right. For small cores or for the very largest, you just can't beat a Champion for production and efficiency.

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CB- 5	4½ lbs.
CB- 10	11 lbs.
CB- 12	30 lbs.
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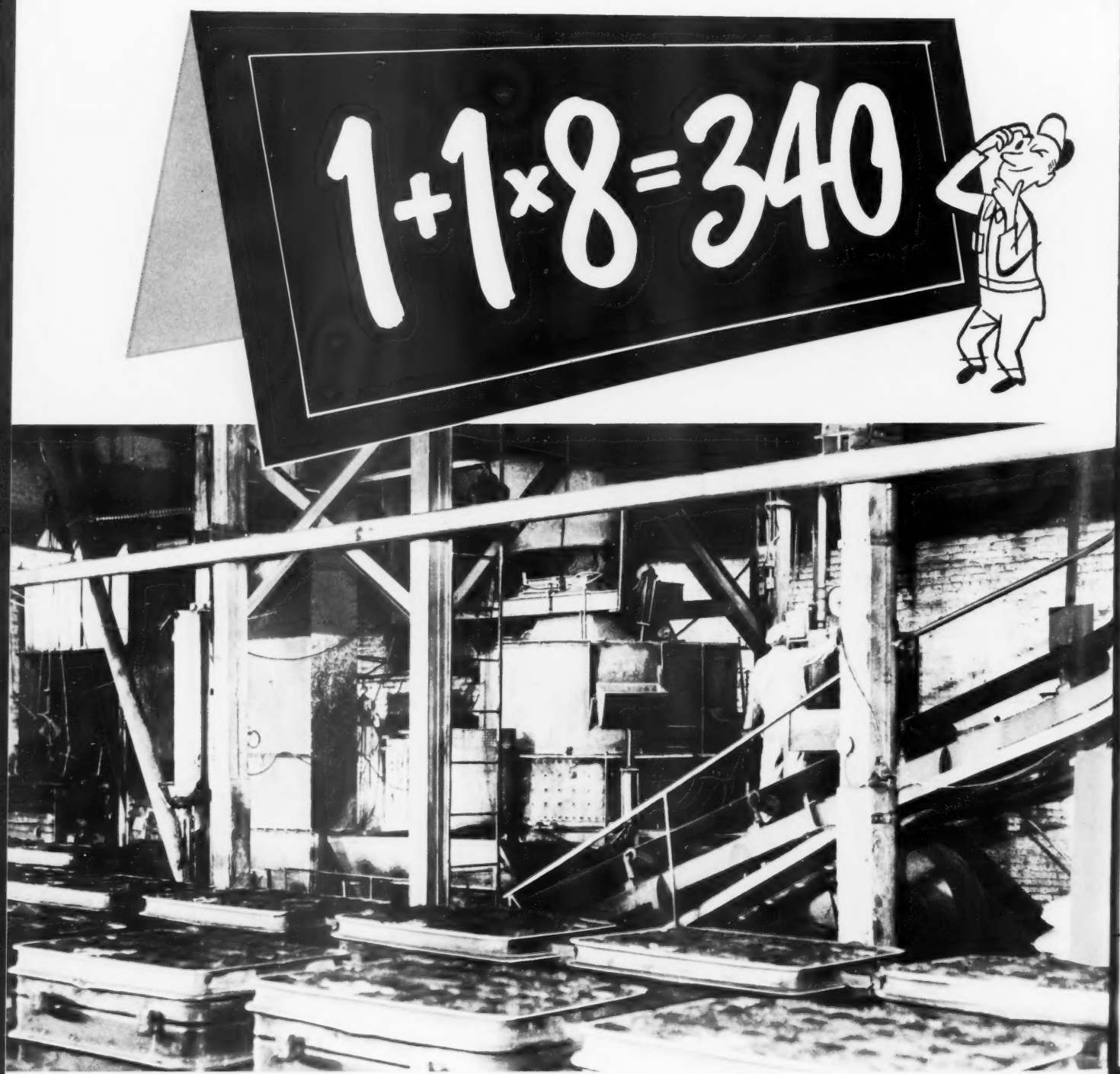

An "80" Speedmullor for molding sand. When space is at a premium—as it is here—the high capacity of the Speedmullor is doubly important. Krause's Model "80" Speedmullor thoroughly mulls and cools their entire molding sand requirement—up to 340 tons in less than 8 hours. One man handles the entire sand preparation job.

And a Mulbaro mulls all the core sand. With their molding sand preparation problems solved by a Speedmullor, the foundry installed a Model 3½ Mulbaro to mull all of their core sand. Using four portable barrows, Krause is able to attain almost continuous operation with their Mulbaro. Most sand handling is eliminated, since coremakers use sand directly from the Mulbaro's portable barrows.

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All of Krause's core sand is prepared in a Mulbaro. Krause uses four barrows with one Mulbaro mulling mechanism, making it possible to mull sand in one barrow while the other barrows are in use at the coremaking stations. Sand is used by the coremakers directly from the barrows, thus eliminating unnecessary sand handling.

Here's another foundry applying BETTER METHODS to meet their demands for mulled molding and core sand. The Speedmullor and Mulbaro—truly today's answers to mulling problems—are doing a real job at Krause Plow. They can do the same job in your foundry. Send today for more information!

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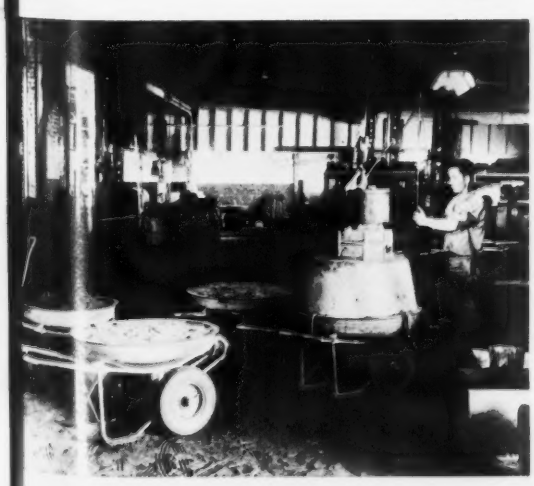

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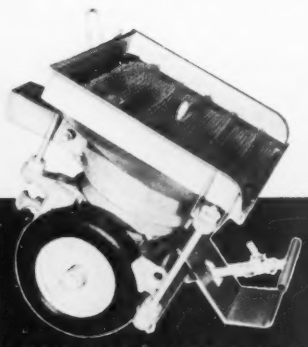
Screenarated sand plus magnetic separation! The Magnarator fills an essential need for the small or medium size foundry. Perfectly balanced and rubber-tired, it is readily moved by hand from foundry floor to floor. Designed for shovel loading, it is built in two sizes with capacities of 20 and 30 tons of sand per hour—sand that is screened, magnetically separated and fully aerated.

Here's where the new Magnarator fits into the B&P floor sand preparation line!



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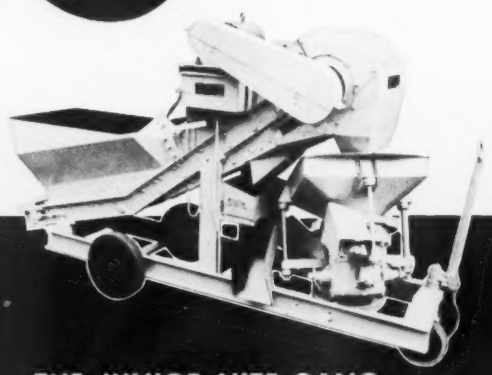
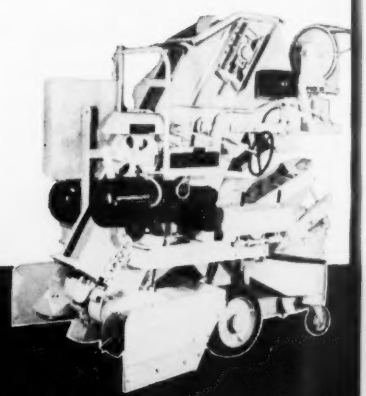
A sand conditioning investment *proved* sound in thousands of foundries the world over. Built in three sizes with capacities of 750, 1000 and 1500 lbs. per minute, Screenarators provide thorough screening and complete aeration of any type of sand. Rugged, dependable . . . trouble-free performance assured with this *lowest* cost sand conditioner!



THE JUNIOR NITE-GANG

Thoroughly foundry tested and approved, the Junior Nite-Gang is a high capacity, highly portable machine designed for use with a front end loader. With a capacity of up to 40 tons of sand per hour, the Junior Nite-Gang provides complete screening and aeration with magnetic separation. Four rubber-tired wheels assure easy movement through the foundry.



THE NITE GANG

Self-loading and power propelled, the Nite-Gang offers the ultimate in floor sand preparation. Shakeout sand is loaded directly from the floor, blended, magnetically separated, screened, doubly aerated and discharged directly into windrow or pile ready for molding. This one-man operated machine offers capacities of up to 50 tons of completely prepared molding sand per hour.

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(*Concluded from page* 148)

the existing mechanical conditions surrounding the air supply.

Compensating for Different Pig Iron Analysis—When pig iron is in short supply it is frequently possible to obtain pig iron of different analysis or grade from that normally used by the individual foundry. Sometimes it is not possible to use these "abnormal" irons because of limiting analysis, but in many instances it would be possible to use with compensating adjustments.

Generally sulphur is not a problem in connection with pig iron, so this factor need not concern us.

The phosphorus content of pig iron does present a problem in many instances, however, this factor also can be adjusted in certain cases. For example, a high-phosphorus pig iron can be used (in limited quantities) if or where the purchased scrap, also high in phosphorus, is correspondingly reduced. Cast iron pipe and enamelware are common sources of this class of material.

Although the carbon content of pig iron varies quite regularly with silicon content, it is not customary to consider carbon in calculating the chemical analysis of the mix. This is a very serious error because in certain instances the desired carbon level cannot be reached because of the low in-going carbon, the current mode of cupola operation or a combination of both.

Normal pig iron (excluding silvery) will have a carbon range of 3.40 to 4.70 per cent varying inversely with the silicon content.

This fact is worthy of note, for if we take the range given for the carbon content of pig iron and consider a 30 per cent pig iron content we could have a difference of 40 points of carbon. Obviously, this is an extreme condition, but it will illustrate the advisability of considering this factor.

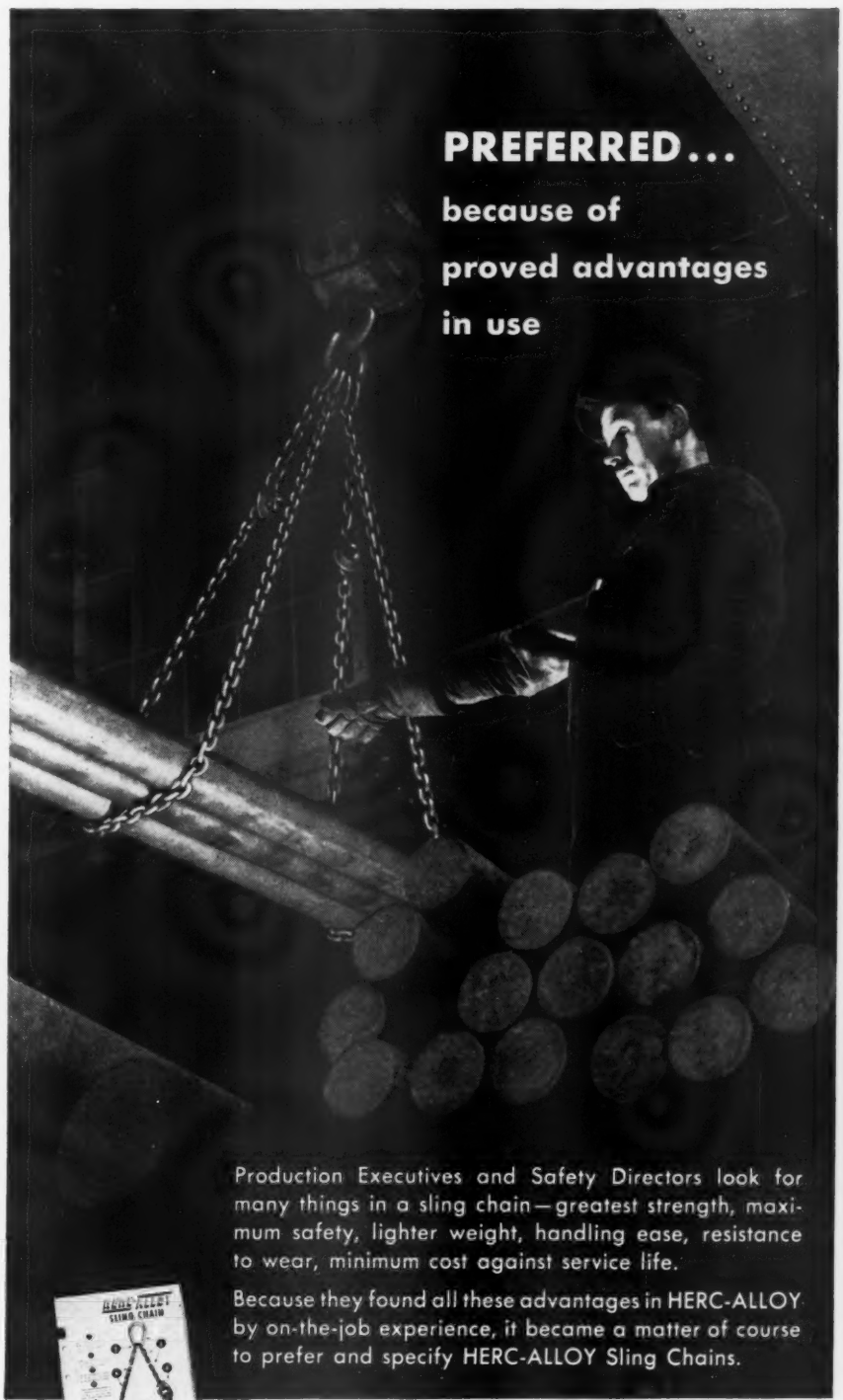
(*To be continued*)

Book Review

Manufacturing Equipment and Processes, by Charles W. Lytle and Arthur F. Gould, cloth, 759 pages, 5¾ x 9 in., published by International Textbook Co., Scranton, Pa. Price $6.50.

Basic equipment and processes used in production industries are discussed in an attempt to clarify their potentialities and suitability for various requirements. The book is a blend of mechanical engineering and engineering economics, emphasizing the principles that should be understood before a process or equipment is selected or put into operation.

HERC-ALLOY
SLING CHAINS



Production Executives and Safety Directors look for many things in a sling chain—greatest strength, maximum safety, lighter weight, handling ease, resistance to wear, minimum cost against service life.

Because they found all these advantages in HERC-ALLOY by on-the-job experience, it became a matter of course to prefer and specify HERC-ALLOY Sling Chains.

Write for illustrated Data Book No. 3 which contains helpful information on sling chain selection and use.

COLUMBUS McKINNON CHAIN CORPORATION
(*Affiliated with Chisholm-Moore Hoist Corp.*)
GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.
District Offices: New York • Chicago • Cleveland
Other Factories at Angola, N. Y., Dixon, Ill., St. Catharines, Ont., Can., and Johannesburg, South Africa.

By EDWIN BREMER

Foundry DEVELOPMENTS

DIRECT process for plating nickel on aluminum which shows considerable promise has been developed on a laboratory scale at the Low Temperature Station for Research in Biochemistry and Biophysics, and described in the December, 1951 issue of *Metallurgia*. The aluminum is given an alkali treatment in a solution containing 50 grams NaOH, 3 grams Lissapol N (wetting agent) and 1 liter H_2O; rinsed in water and given an acid etch. Etching solution is composed of 2.5 cc conc. HCl, 50 cc melted crystals trichloracetic acid, 250 cc H_3PO_4 (1.75 sp gr), 200 cc lactic acid (1.21 sp gr), 3 grams Lissapol N, and water to 1 liter. Etching is for 1 minute at 75° C, increasing time if necessary. Then material is immersed in HNO_3 (1:4) for 15 seconds and rinsed in water. Aluminum is plated for 1 hour 20 minutes at a current density of 15 amp per sq ft in a bath containing 120 grams nickel sulphate, 21 grams ammonium sulphate, 8 grams potassium chloride, and water to 1 liter. Temperature of bath is 35° C, and the pH of solution 5.6 to 5.8.

* * *

SOUTHERN foundry soon will be producing cast iron pipe as small as 2-in. ID by the centrifugal process using metal molds. The pipe is about 10 ft long. Method of production was developed in France by a well known maker of cast iron pipe.

* * *

UNDERGROUND corrosion of steel pipe has been estimated to cost $600 million annually in the United States, and workers in the field have learned that such corrosion can be reduced greatly by cathodic protection techniques in which the structure is maintained at a suitable negative electrical potential. A recent study by W. J. Schwerdtfeger and O. N. McDorman of the National Bureau of Standards corrosion laboratory provides a better understanding of the mechanism of that important method of inhibiting underground corrosion. By eliminating uncertainties inherent in field measurement NPS was able to determine an optimum protective potential for effective protection which has a firm scientific basis. The value determined—minus 0.77-v referred to a saturated calomel electrode—was confirmed by weight-loss measurements on electrodes maintained at the selected potential in five corrosive soils.

* * *

CORES for diesel cylinder barrels made on a core blowing machine by a midwestern foundry are produced from the following mixture, according to *Better Methods*: 37½ gal Lake Michigan sand with an AFS fineness of 58, 2 qt core oil, 1½ gal light corn flour, 2 gal silica flour, 1 pt bentonite, and 5 qt water. Batch is mulled for 90 seconds, and shows a green strength of 1.4 psi, moisture between 1.9 and 2.0 per cent, baked permeability about 120, and a core hardness number of 75 to 80.

* * *

APPARATUS has been developed in the laboratory of the British Cast Iron Research Association for measuring the deformation of sand at all loads up to the breaking load. It is described in the December, 1951 issue of the *Journal of Research and Development* by R. G. Godding. Conclusions drawn by the author from tests performed include:

(1) With mixtures containing sand and clay only, strain is almost directly proportional to stress, until at maximum stress complete collapse of the test piece and very rapid fall in stress occurs.

(2) Maximum stress is raised with increasing moisture content, but strain at maximum stress and the general shape of the curve are unaffected.

(3) Maximum stress is raised considerably and the strain is increased slightly with increase in clay content.

(4) Addition of wood flour or of certain fibrous materials reduces maximum stress but greatly increases the corresponding strain. Shape of the curve is completely changed. As maximum stress is approached there is an increase in strain, but no sudden failure of the test piece, and strain increases at a fairly constant rate with a gradually falling stress.

(5) Scabbing is likely to occur when the strain at maximum stress is low, and the test piece collapses rapidly on reaching maximum stress. Scabbing is unlikely to occur when the strain is high, and stress falls slowly with increasing strain after maximum stress is reached.

* * *

NEW hard coatings for aluminum where high resistance to abrasion is desired, are being released to licensees by the Aluminum Co. of America. The coatings are claimed to have special value where hard, long-wearing surfaces coupled with light weight are essential, as in surfaces subjected to abrasion or erosion. New wear-resistant finishes are anodic oxide coatings which form an integral part of the metal they protect. Intrinsically hard, aluminum oxide coatings cannot be chipped or flaked from the parent metal.

* * *

METALS under stress at high temperatures are not nearly as strong as at ordinary temperature, and when stressed to the breaking point, rupture with very little warning stretch. Late in 1951 engineers of General Electric Co., discovered a mathematical relationship which relates strength to time and temperature—$P = T(C+\log t)$ where P is a constant for constant stress and a particular material, T is the absolute temperature in ° Rankine, C is a material constant which has a value of about 20 for all materials, and t is the duration in hours of the stress. With the new equation it is possible to select materials for use in long-lived equipment on the basis of creep and rupture tests that require months instead of years, reducing delay between development and application of new alloys, and increasing output of testing facilities.

* * *

REPORT by the Naval Research Laboratory on "Resistance of Materials to Mechanical Shock" is now available through the Office of Technical Services, Department of Commerce, Washington 25. Result of a study to discover why parts of military vehicles failed due to vibrations set up by shock, the report offers a guide for automobile manufacturers and military equipment builders interested in designs utilizing shock resistance of a material. Report is PS 105 301, and available for 75 cents each.

HOW AMERICA OUT-PRODUCES THE WORLD

Logan Roller Conveyors increase output, by mechanical handling of parts to and from sorting operations and to grinding machines.

1 American Industry { *"Brings the work to the men instead of sending the men to the work"*

When materials and parts are brought mechanically to work stations, human hands are free for purely productive operations. The result—greatly increased output, and with less tiring effort. It's the American way.

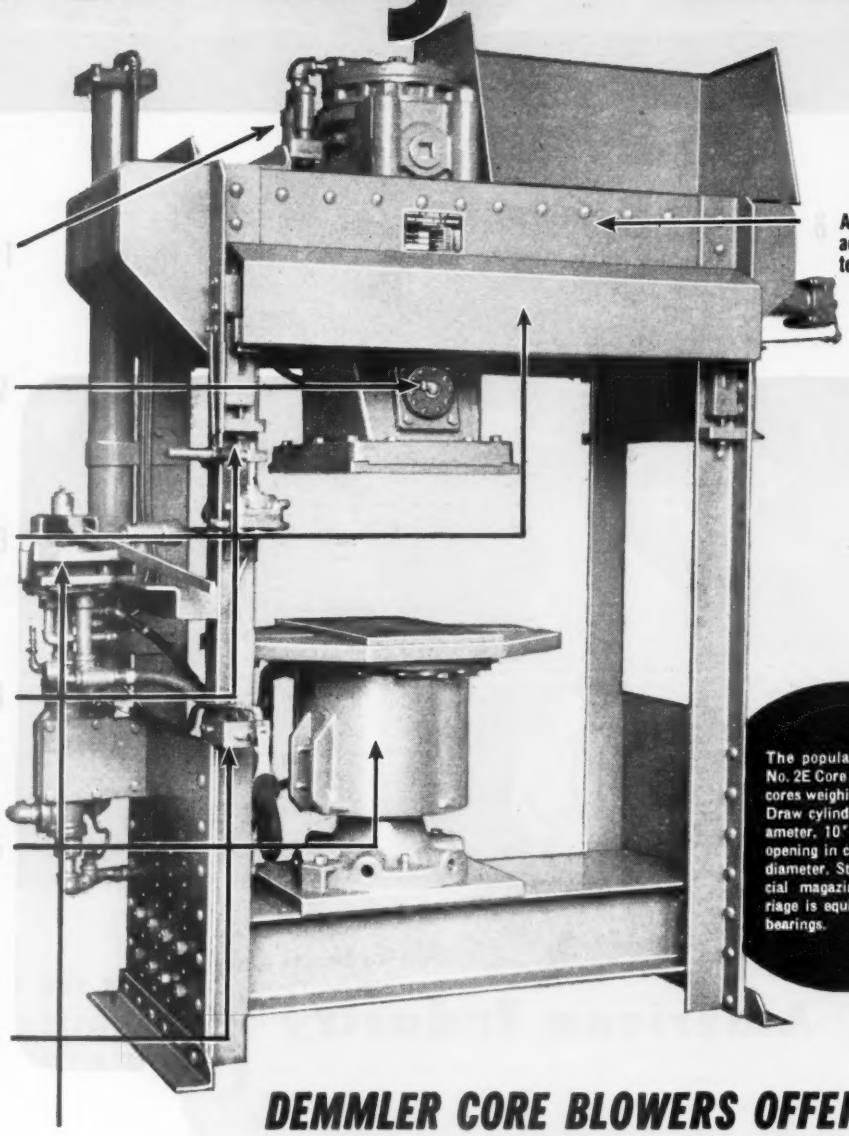
Logan Conveyors have been an integral part of the foundry "mechanical handling picture" for two generations. From molding through pouring and cooling, to shakeout, and also through machining operations, Logan equipment puts flow into American foundry production, clips hours and days off foundry production schedules—brings the work to the men.

Write for literature or for nearest engineer to call.

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

Better Eight Ways



Ultra high speed blow valve action — increasing initial blow pressure 25% above other machines.

Magazine exhaust valve – extra large size – quick acting – immediately exhausts air from magazine after core is blown.

Cross head rails – on outside of machine frame – out of sand area – where drawing accuracy would be impaired.

Leveling adjustment – 4 screw adjustment for complete adjustment of core box to draw–EASILY ACCESSIBLE.

Completely enclosed drawing post – drawing accuracy within thousandths – protected from sand and abrasion – assuring long, trouble-free life.

2 speed hydraulic draw control – low speed while vibrator is acting and quick drop after core is drawn.

All parts of machine easily accessible for low maintenance costs.

The popular DEMMLER No. 2E Core Blower handles cores weighing up to 20 lbs. Draw cylinder is 14" in diameter, 10" stroke. Throat opening in carriage is 7" in diameter. Standard or special magazine sizes. Carriage is equipped with ball bearings.

Hard, chrome plated valve seats – to insure against rust and deterioration.

DEMMLER CORE BLOWERS OFFER EVERY IMPORTANT DESIGN ADVANTAGE . . .

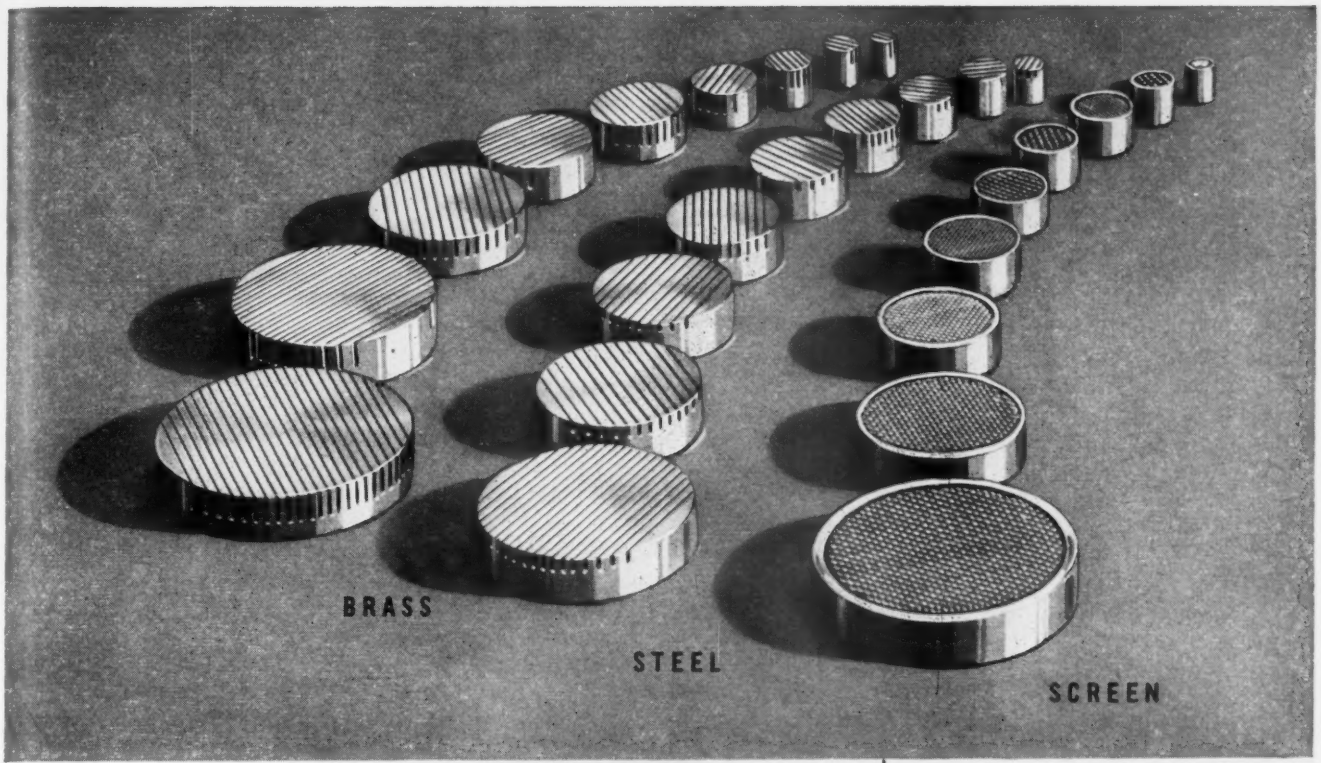
DEMMLER Core Blowers — and only DEMMLER Core Blowers — offer you all eight of the important design features by which core blower value is determined. Here's a check list of DEMMLER features. Compare them with those offered by any other core blower — then you be the final judge of values!

*Remember, every DEMMLER Core Blower possesses outstanding features. Little wonder that DEMMLER Core Blowers are often copied – never equalled!

Wm. DEMMLER & BROS., Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

speed plus dependability



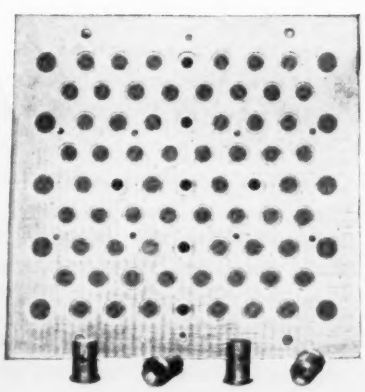
PRECISION CORE BOX VENTS BY

DEMMLER

• You eliminate all guesswork when you use precision made DEMMLER Core Box Vents. These high-quality vents adhere precisely to specifications because they are precision built to close tolerances. In addition, DEMMLER core box vents possess great rigidity — are truly designed for practical foundry application.

Dependable, efficient, long-lived DEMMLER core box vents are available in brass slotted, steel slotted and screen types. Each of these types offer a wide variety of sizes to meet every application.

Always specify DEMMLER core box vents — you can count on them for quality far above ordinary standards.



UNIVERSAL BLOW PLATE

DEMMLER Universal Blow Plate consists of two plates with separators between, allowing the air from the core box to escape between the plates. The blow tubes and vent bushings are interchangeable so any hole in these plates can be used either as a blow hole or a vent. These plates are recommended for use only on open top, or half core boxes. They are manufactured in any size to suit the bottom dimension of the sand magazine.

Write for illustrated Folder

WM. DEMMLER & BROS., KEWANEE, ILLINOIS

Manufacturers of Core Blowers Exclusively Since 1911

SPECIFICATIONS

BRASS SLOTTED CORE BOX VENTS

Slot Widths: .010", .013", .015"

Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2"

The brass slotted vents have thick heads, so that they may be used in round or curved core box surfaces, and the heads scraped to conform to the contour of the box. Very fine sand requires the use of vents with .010" slots, but .015" slots may be used, with the usual lake sand core mixtures.

STEEL SLOTTED CORE BOX VENTS

Slot Widths: .010", .013", .015"

Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2"

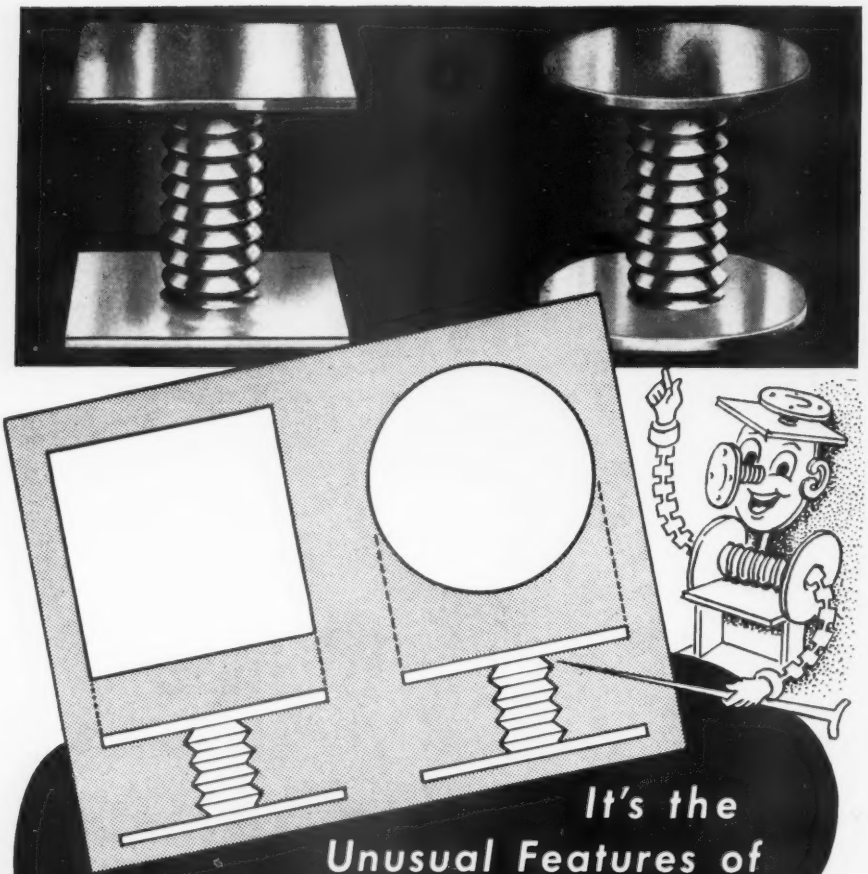
The steel slotted vents have thin heads, to make them easy to keep clean, and are preferable for use in flat surfaces of core boxes. They are hard chrome plated to prevent rust.

SCREEN TYPE CORE BOX VENTS

Mesh: #30, #40, #50

Diameters: 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1-1/4", 1-1/2"

Screen type vents provide maximum ventilation, and are preferred by many of our customers for this reason. Coarse screen vents may be used in core prints, where it does not matter if the vent leaves a slight mark on the core. They are also useful in vented plates used under core boxes which are open at the bottom.



It's the Unusual Features of

Milwaukee CHAPLETS

that Insure Instant Fusing in any Casting

It's the sharply cut "thread stem" design that insures instant fusing. Metal melts at the edges first, that's why the sharp edges "burn in" quickly and completely to insure instant fusing which results in freedom from leakers. As the fusing cycle slows up through the base of the thread and into the stem itself, there is ample time for adequate and proper core support. Here is a design where fusion takes place at exactly the right speed to give you both instant fusion plus proper core support.

Write for Samples and Prices

Milwaukee Chaplet & Mfg. Co.

1025 SOUTH 40th STREET • MILWAUKEE 4, WISCONSIN

OBITUARY

WILLIAM L. DEAN, president and general manager, Mathews Conveyor Co., Ellwood City, Pa., died Feb. 6 at his winter home in Florida. Associated with the company since 1909, Mr. Dean was also president of the company's West coast and Canadian subsidiaries. Active in the

WILLIAM L. DEAN

work of the Foundry Equipment Manufacturers' Association, Mr. Dean was president of that organization in 1949. He also served for one year as vice president of the National Castings Council.

* * *

Mrs. I. V. Scanlan, known to thousands of foundrymen in America and in foreign countries through her connection with the Milwaukee Correspondence School of Foundry Chemical Analysis, died Jan. 31. She was one of the first to join the late David McLain when he established his educational institution shortly after the turn of the century. Eventually she became his chief assistant and since his death several years ago she conducted the business herself.

* * *

Burl A. Dollens, 50, vice president of General Motors Corp., and general manager, Electro-Motive Division, LaGrange, Ill., died Feb. 9 in Hinsdale, Ill. Mr. Dollens had been associated with General Motors since 1925 when he was graduated from Purdue University. He first joined the Delco-Remy Division, Anderson, Ind., and in 1931 was made superintendent of the gray iron foundry for that division. Advancing to superintendency of Plant Six in 1939, Mr. Dollens became superintendent of the company's new aluminum foundry in 1941. With the opening of another aluminum foundry in Bedford, Ind.,

(*Concluded on page* 160)

FOR GOOD DELIVERY ...BETTER QUALITY...

BS&B FOUNDRY FLASKS

Yes, BS&B can deliver light, medium or heavy duty foundry flasks without long waiting periods! If you have not used these superior flasks before, you will be amazed at their many advantages.

The quality of BS&B Foundry Flasks starts with construction. They are formed cold from full-gauge steel plate. The bearing bars are welded to the walls, both inside and outside. It is this double-welded construction that eliminates stress and strain on bearing bars and gives the BS&B Foundry Flask its stamina and endurance.

In actual use, many foundries have proved the economy of BS&B Foundry Flasks. Molders prefer them. Cost records on repair, replacement and other maintenance show they are capable of delivering more castings per flask throughout their service life.

BS&B Flasks are available in round, square and rectangular shapes for light, medium or heavy duty. Pinplugs are standard equipment, available in all styles, and can be had in any arrangement desired. Special flasks can be fabricated to meet your own particular specifications.

FREE! BS&B Foundry Flask Bible

This handy catalog is a useful foundryman's handbook. It contains complete diagrams, specifications, tables and all pertinent information on BS&B Foundry Flasks as well as an easy-to-order system. Write us now. Your free copy will be sent to you promptly!

FOUNDRY BS&B FLASKS

BLACK, SIVALLS & BRYSON, INC.

7500 East 12th Street — *Foundry Flasks Division* — Kansas City 3, Missouri

DEPT. 7-AR3

HAUSFELD

METAL MELTING **FURNACES**

FOR

BRASS—ALUMINUM—MAGNESIUM

AND ALL OTHER NON-FERROUS

METALS AND ALLOYS

GAS OR OIL FUELS

TILTING AND NON-TILTING TYPES

SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page* 158)

in 1943, Mr. Dollens was appointed general superintendent of nonferrous foundries. He served as general manager of the Saginaw Malleable Iron Division, Saginaw, Mich., from 1945 until 1950, when he was appointed general manager of the Electro-Motive Division.

* * *

Dr. Edward G. Mahin, 75, director of the Department of Metallurgy, University of Notre Dame, South Bend, Ind., until his retirement two years ago, died recently. He had been with the university since 1925.

* * *

Raymond C. Gaugler, 59, president, American Cyanamid Co., New York, died Jan. 11. Mr. Gaugler had been associated with American Cyanamid since 1917 and was elected president in January, 1951.

* * *

Elmer E. Phelps, 88, who operated a brass foundry in Syracuse, N. Y., for 25 years, died in that city Jan. 9. Prior to his retirement in 1937, he had served as foreman for the Engelberg-Huller Co., Syracuse.

* * *

William Lugge, 59, sales manager for Enterprise Foundry Inc., Belleville, Ill., died Feb. 1 at East St. Louis, Ill.

* * *

Morrison G. Cain, 65, chief engineer, Dobbie Foundry & Machine Co., Niagara Falls, N. Y., died Jan. 24.

* * *

A. H. Popperwell, 67, vice president of Reliable Iron Foundry Inc., Los Angeles, died recently.

* * *

W. William Grant, 77, founder of the Grant Bros. Foundry Co., Detroit, died recently at his home in that city.

* * *

John H. Bunte, 65, for many years purchasing director of Howard Foundry Co., Chicago, died recently.

Book Describes Foundry

Cooper Alloy Foundry Co., Bloy & Ramsey Ave., Hillside, N. J., has published a booklet, "Alloys in Cooperland," which follows the style of *Alice in Wonderland.* The Walrus is conducted on a tour through the plant, and operations in all departments and characteristics of different alloys are explained to him by the guide. The book is colorfully illustrated with cartoon-type pictures, and text material is set in third-grade size type. It is priced at $1.

Core handling is safer and cheaper overhead!

A Zig-Zag Conveyor in a large plumbing supply foundry. Baked cores are transferred direct from ovens to conveyor for movements to checking benches, eliminating "heavy" lifting and moving by women employees.

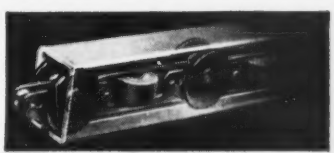
with R-W "Zig-Zag"® Continuous Power Conveyor

Fragile cores can't take it! And costs go skyrocketing when a sudden bump or jerk in handling destroys part of a day's production. But you don't need to worry about breakage when your cores are carried overhead—smoothly and in perfect safety—on a ZIG-ZAG Continuous Power Conveyor.

ZIG-ZAG operates just like "water through a pipe"—it's a steel tube-like track through which travels a specially constructed motor-driven chain carrying unit loads up to 125 pounds at speeds ranging from 1 inch to 60 feet per minute. And it's highly flexible too—if changes or relocation are required, you can take it down here and put it up there, and in most cases *use all the parts!*

★ ★ ★

Learn how patented ZIG-ZAG can save money in your core department. Send for details—or better yet, have an R-W engineer consult with you at no obligation.



Engineered for Economy and Flexibility

- Horizontal and vertical units alternate in a continuous chain traveling through special steel tubing.
- Complete flexibility for installation in any plant. Easily installed, easily changeable to conform to plant alterations.
- SAFE—all moving parts are fully enclosed.
- Low first costs. Low Power Factor.
- Standard horizontal or vertical curves—two-foot radius.

Richards-Wilcox Mfg. Co.

"A HANGER FOR ANY DOOR THAT SLIDES"

AURORA, ILLINOIS, U.S.A. *Branches in all principal cities*

SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT
INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS
ELEVATOR DOOR OPERATING EQUIPMENT

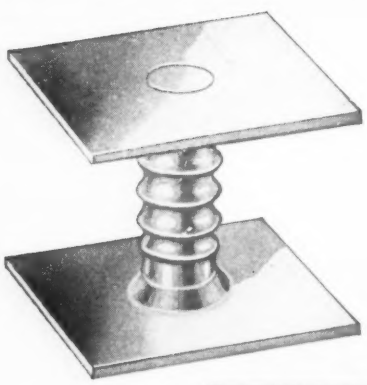
1880 RICHARDS WILCOX R-W AURORA TRADE MARK Reg. U. S. Pat. Off. 1952

OVER 72 YEARS

FANNER

GROOVESTEM

CHAPLETS



. . . insure maximum fusion resulting in sounder castings

The pictures below graphically show why. They visualize the findings of studies conducted by Battelle Memorial Institute of Columbus, supplemented by field tests in leading foundries. And more and more companies doing critical casting work are standardizing on this new chaplet because of its all around superiority.

COUNTERSUNK SHOULDERS ELIMINATE GAS POCKETS

Sharp, right angle shoulders of conventional type of chaplet form large gas pockets.

Raised shoulder of this type reinforces but tends to form small gas pockets.

Fanner Countersunk shoulder has a taper design which reinforces head and eliminates gas pockets.

FEATHEREDGE FUSION RINGS ELIMINATE LEAKERS

Rolling metal does not seal against straight side of conventional stem; small pockets remain.

Deformed stem offers better sealing surace for metal, but some voids may be created on inside radii.

Knife-like edges of fusion rings heat instantly, fuse completely, eliminate leakers.

RADIUS GROOVES EFFECT MAXIMUM FUSION

Conventional chaplet fails to fuse completely both along stem and at shoulders.

Threaded stem creates gas pockets at base of threads.

Rounded grooves of Fanner chaplet permit metal to "lay up" close to stem and effect maximum contact and fusion.

Groovestem Chaplets either tin or copper coated are available in motor Button Head and Double Head types. They are stocked in substantial quantities to give you the fastest possible service. Order today.

FANNER MFG. CO., CLEVELAND 9, OHIO

In Canada: CANADIAN FANNER, LTD., Hamilton, Ont., Canada

STANDARD SPECIFICATIONS FOR FERROBORON

ASTM Designation: A 323—50T

Issued, 1949; Revised, 1950.

Scope

1. These specifications cover four grades of ferroboron, designated A, B, C, and D.

Basis of Purchase

2. (a) The material furnished under these specifications shall be crushed to the specified size, and mixed before packing, so that the quality in each package is uniform with the lot.

(b) The reported percentage of boron as obtained by chemical analysis shall be used to determine the billing of the material to the purchaser.

Chemical Composition

3. The various grades shall conform to the requirements as to chemical composition prescribed in Table I

Table I—Chemical Requirements for Ferroboron[a]

Grade	Boron per cent[b] Minimum	Boron per cent[b] Maximum	Carbon, maximum, per cent	Silicon, maximum, per cent	Aluminum, maximum, per cent
A	10.0	14.0	2.0	4.0	0.50
B	14.0	19.0	2.0	4.0	0.50
C	19.0	...	2.0	4.0	0.50
D	17.5	...	0.50	1.5	0.50

[a] For purposes of determining conformance with these specifications, the reported analysis shall be rounded off to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (A.S.T.M. Designation: E 29)

[b] For purposes of determining the boron content to any shipment, boron shall be reported to the nearest 0.01 per cent, applying the same rounding-off procedure as prescribed in Footnote a.

Packing

4. Ferroboron shall be packed in sound containers in such a manner that none of the metal is lost in shipment.

Inspection

5. (a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's work which concern the sampling, packing and shipping of material ordered. The manufacturer shall afford the inspector all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with these specifications.

(b) If the purchaser so elects, the material may be sampled by him at the destination, in which case at least 10 per cent of the shipment shall be sampled.

Rejection

6. Any claims or rejections based on check analysis shall be made to the manufacturer within 30 days from receipt of material by the purchaser.

Sampling

7. The material shall be sampled in accordance with the Standard Methods of Sampling Ferro-Alloys (A.S.T.M. Designation: E 32)

Chemical Analysis

8. The chemical analysis shall be made in accordance with a procedure agreed upon between the manufacturer and the purchaser.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for a nominal sum.

STANDARD SPECIFICATIONS FOR FERROTITANIUM

ASTM Designation: A 324—50T

Issued, 1949; Revised, 1950.

Scope

1. These specifications cover six grades of ferrotitanium, designated A, B, C, D, E, and F.

Basis of Purchase

2. (a) The material furnished under these specifications shall be crushed to the specified size, and mixed before packing, so that the quality in each package is uniform with the lot.

(b) The reported percentage of titanium as obtained by chemical analysis shall be used to determine the billing of the material to the purchaser.

Chemical Composition

3. The various grades shall conform to the requirements as to chemical composition prescribed in Table I.

Table I—Chemical Requirements for Ferrotitanium[a]

Grade	Titanium per cent[b] Minimum	Titanium per cent[b] Maximum	Carbon per cent Minimum	Carbon per cent Maximum	Silicon per cent Minimum	Silicon per cent Maximum	Aluminum maximum per cent
A	38.0	45.0	...	0.10	...	5.0	9.0
B	20.0	27.0	...	0.10	...	5.0	6.0
C	15.0	18.0	6.0	8.0	...	3.0	2.5
D	15.0	25.0	...	0.50	15.0	25.0	1.0
E	17.0	20.0	3.0	5.0	...	3.0	4.0
F	25.0	31.0	...	0.10	20.0	25.0	1.5

[a] For purposes of determining conformance with these specifications, the reported analysis shall be rounded off to the nearest unit in the last righthand place of figures used in expressing the limiting value, in accordance with the rounding-off method of the Recommended Practices for Designating Significant Places in Specified Limiting Values (A.S.T.M. Designation: E 29).

[b] For purposes of determining the titanium content of any shipment, titanium shall be reported to the nearest 0.01 per cent, applying the same rounding-off procedure as prescribed in Footnote a.

Packing

4. Ferrotitanium shall be packed in sound containers in such manner that none of the metal is lost in shipment.

Inspection

Inspection

5. (a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the sampling, packing and shipping of material ordered. The manufacturer shall afford the inspector all reasonable facilities, without charge, to satisfy him that the material is being furnished in accordance with these specifications.

(b) If the purchaser so elects, the material may be sampled by him at the destination, in which case at least 10 per cent of the shipment shall be sampled.

Rejection

6. Any claims or rejections based on check analysis shall be made to the manufacturer within 30 days from receipt of material by purchaser.

Sampling

7. The material shall be sampled in accordance with the Standard Methods of Sampling Ferro-Alloys (A.S.T.M. Designation: E 32).

Chemical Analysis

8. The chemical analysis of the material shall be made in accordance with the procedure agreed upon between the manufacturer and the purchaser.

Additional copies of this specification may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, for a nominal sum.

More and More Longer Lasting Norbide* Nozzles...

...are bringing increased efficiency to pressure blast cleaning

Molded from "the hardest material made by man" Norbide Nozzles outwear conventional cast iron nozzles hundreds of times . . . their orifices do not readily enlarge and thus the stream of sand or shot remains concentrated . . . air pressure does not drop.

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AROUND THE COUNTRY

News Reports from . . .

Chicago

MAGNESIUM foundry operations at the Aircraft Engine Division, Ford Motor Co., here, will not suffer in the transition from output of reciprocating to turbo-jet type engines. Much speculation on this arose when, late in January, the Air Materiel Command, Wright Field, Dayton, O., announced that Ford had been given a $30 million contract to build J-57 Pratt & Whitney jet engines, and in connection with this would progressively halt output of the piston-type engine scheduled to get under way in March. The announcement said jet production would not start for a year because of retooling requirements.

Reactivation of the plant, the former Dodge Chicago Plant of Chrysler Corp. in World War II, started in November, 1950. The magnesium foundry has been in production for some time and, in addition to building up banks of castings for the R-4360 28-cylinder Pratt & Whitney Wasp-Major engine, has been supplying castings for jet engines to several manufacturers on a contract basis. Thus, the shift to castings for jet will not be as drastic as supposed. Furthermore, magnesium casting requirements for jet engines are equal to if not greater than for reciprocating engines, and some of the castings are even larger.

Original contract for the piston-type engine was in the neighborhood of $600 million and the extent to which this program will be reduced has not been indicated. It is known, however, that the 1952 production schedule has been halved and that by start of 1953 output will be turned exclusively to jets.

Since castings are poured in dry sand, all molds are baked. Because larger castings will be required in the jet program, one of the baking ovens now is being enlarged to accommodate mold plates 55 inches square. Previous maximum was 48 inches.

First reciprocating engine was assembled and put on test in January. The contract and production schedule calls for shipment of first engines in March.

The Air Materiel Command has had in its possession for some time the complete estimate of cost for converting the idle aluminum foundry to magnesium, but has not given the go-ahead. This foundry, a twin of the magnesium shop, would be used to supply castings to other aircraft engine manufacturers.

* * *

SMALL-SCALE production of tank hulls and turrets was started recently at the government-owned cast armor plant in East Chicago, Ind., reactivated in 1951 by American Steel Foundries, which designed and built it during World War II. Original cost of the plant was approximately $26 million. It is reported that reactivation, including several million dollars for repairs resulting from disuse of the facility since end of the war, entailed an expenditure of more than $18 million.

* * *

CONTINENTAL Foundry & Machine Co., East Chicago, Ind., has completed installation of a big betatron—a penetrating x-ray machine capable of detecting flaws in steel 8 in. thick. It is being used to inspect the cast hulls of two new-model army tanks. The betatron was constructed by Allis-Chalmers Mfg. Co.

Philadelphia

GRAY iron foundry operations are off from a month ago, now averaging around four days a week. The squeezer shops appear to be hit hardest, running less than four days a week. Soil pipe production also is dragging. Pressure pipe foundries, on the other hand, continue active due in part to large backlogs and to strong demand for certain specialties in which they are engaged. Foundries turning out large castings for utilities and equipped for the production of machine tool components are generally busy, but such plants are not too numerous in this district. Pig iron supplies are reasonably adequate, with scrap and coke plentiful.

Steel casting plants continue highly active, operating five days a week and pouring into the sixth. Most are booked ahead 16 weeks and in some cases as much as 22 weeks. These shops have considerable defense work, compared with little for the gray iron plants. Malleable business is being cut back some, although most shops are averaging close to five days a week. Railroad requirements are off; also fittings. However, malleable shops have benefited to some extent by the overflow of work at the steel casting plants. Where steel castings are not available malleable for certain requirements is being substituted.

Los Angeles

THE TREND toward lower foundry activity in this district is slowly reversing itself. The year-end lull affected ferrous foundries most severely. Iron foundries during the fourth quarter were reduced to existing on a hand-to-mouth basis as backlogs for some became nonexistent. Even for the nonferrous foundries—usually the most active—the period was one of lessened operations. A few iron foundries are still operating only 1-3 days a week, but generally the picture is beginning to look brighter. Some plants have increased backlogs from

(*Continued on page* 168)

made better!

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(*Continued from page* 166)

zero to 30 days.

The upswing in business is attributed to better orders for civilian goods rather than to defense needs. Foundries have taken to the road to sell their services and are seeking new customers to replace old ones who have reduced their purchases. With competition more intense more foundries are mechanizing in their efforts to reduce costs. Indicative of effects of competition is the growing softness of casting prices.

Although statistics show California high in dollar volume of awarded defense contracts, the proportion of direct defense business held by foundries in this district is small, and subcontract work is slow to filter down to casting producers. A few small contracts for hand grenades and a major program for mechanized personnel carriers at Food Machinery Corp., San Jose, Calif., comprise the prime defense contracts to foundries in this area. Fourteen per cent of all defense contracts have been awarded in California (New York 17.2 per cent, Michigan, 8.2 per cent, ranked first and third.)

SOME rather important news to foundrymen is contained in a number of unrelated automotive items—public acceptance of power steering and power braking, adaptation of an automatic transmission to commercial vehicles, desire for diesel engines in farm tractors. There is considerable significance also to be attached to some changes in Air Force plans relative to reciprocating and jet engines.

Behind these developments can be found both good and bad news, foundrywise. Certain it is that they will affect in some way the long-term outlook.

That an automobile may require an extra few pounds of castings for the hydraulic cylinder of a power steering or braking device, or that a truck may be larger outlet for castings because it embodies a torque converter which requires a cast housing may be somewhat academic information as long as production of vehicles is restricted. Such things, however, affect the status quo, and one foundry which may be reducing its melt because an automotive engine contains less metal than the previous one did may have a colleague in the industry who suddenly starts turning out castings for automotive components for which a volume market never before existed.

No clear indication is yet apparent of the meaning of the farmer's preference for diesels, available now only as replacement engines. In some circles it is thought that the number of tractors bought would decline if diesel engines were available as original equipment. The argument here is that one diesel tractor would have the flexibility obtainable only with two or more gasoline-powered tractors.

On the Air Force matter, the change in emphasis from piston engines to jets has become apparent. Ford's government operation in Chicago where its first R-4360 reciprocating engine was recently built is a case in point. About a year from now that plant will begin working on J-57 turbojet engines. Bigger and better jets have been predicted by many people, including the general manager of General Motors' Allison Division, who thinks power will be up to 50,000-hp inside of five years. A big future for small jets for light planes has also been predicted by Continental Motors Corp.

These things are not easily translatable for their effect on the light metals foundry industry. At first glance it would appear as though the lack of cast cylinders might hurt the industry. It is interesting in this connection, therefore, to study some comparisons developed by Dow Chemical Co. on the use of cast magnesium products in present-day aircraft as against World War II planes. The long-range bomber of 1940 used about 1000 lb of cast magnesium in its engines and wheels. Today from 10,000 to 20,000 lb is used in a long-range bomber. The Allison turbo-prop engine which powers the Douglas A2D Skyshark weighs 2500 lb, of which 570 lb are magnesium casting. In the Sikorsky S-55 helicopter ninety parts are magnesium castings, a total of about 400 lb. At the same time, however, some loss in aluminum casting use is indicated compared with World War II requirements.

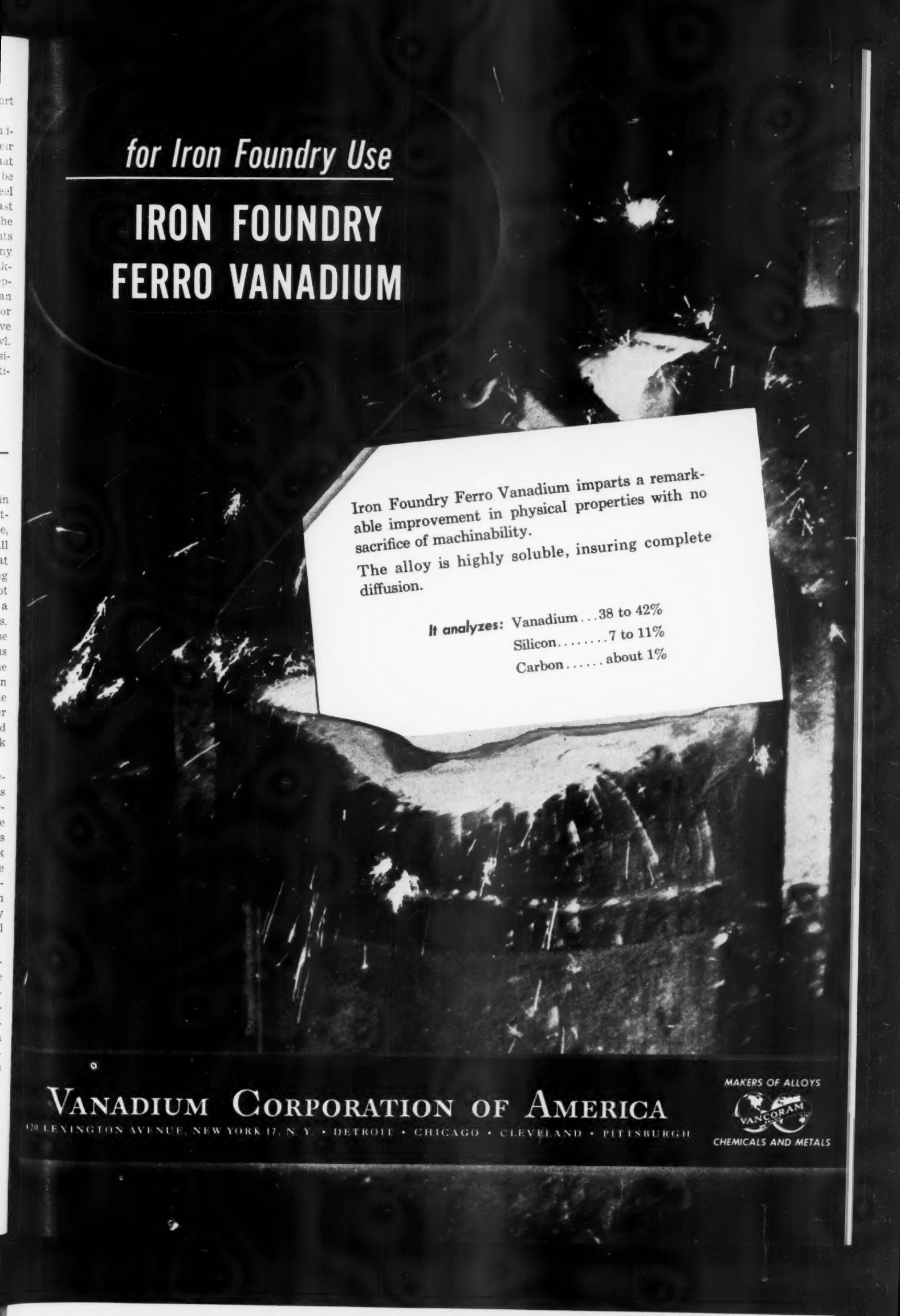
On the local scene, only hope that automotive foundry operations can hold their own is that more copper will be allocated to the auto industry or that the latter can translate its increased aluminum supplies into better assembly schedules. Automakers argued their point lucidly before a special government task force that more defense work was wanted but that its effects would be too long in being felt to prevent further unemployment in the Detroit area. Gray iron and malleable foundries, except those working on industrial equipment castings, are operating short shifts and reduced work weeks.

Raw materials suppliers are finding it difficult to dispose of all their pig iron, coke and scrap. Signs that high steelmaking operations will be jeopardized by lack of finished steel demand makes this outlet for blast furnace hot metal more dubious. The drift in activity in many segments of the industrial economy has many plant managers and sales people frankly worried. Foundrymen are no exception. Restricted output of civilian goods and short rations of brass for such items as plumbing fixtures have slowed many foundries to a crawl. Steel foundries are the best off, businesswise, but even here some spottiness is apparent.

WHILE gray iron shops engaged in machine tool work and large castings for other purposes are active, foundries equipped only for small work, and which constitute the great majority in this district, are finding business slow. These latter are not operating at more than four days a week and in some instances even less. There is little or no direct defense work, and restrictions on various civilian requirements are making the going rough for those engaged in light work. The steel and malleable shops, however, are in much better position. Backlogs are heavy and operations are on a five-day-week basis or better.

Nonferrous shops have had a definite slump. Brass and bronze shops are receiving little in the way of defense work and report a sharp decline in civilian business. Some operators are quite pessimistic over the outlook for the year, although they say there may be a stepping up in ship requirements within a few months which would help. But shops feel that they are going to have to dig hard for all the business they can get.

Barring one or two notable exceptions, aluminum foundries also are experiencing a decided lull. Deferment in aircraft requirements is being seriously felt and various operators believe that if there is not a lessening in the curtailment of civilian needs as time goes on, 1952 is going to prove a disappointing year. Major hope is for a substantial stepping up in aluminum output in the last half, which might lead to an easing in govenrnment restrictions on civilian products.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MALLEABLE FOUNDERS HOLD SEMIANNUAL MEETING

MALLEABLE Founders' Society semiannual meeting in Cleveland, Jan. 18 was devoted largely to a discussion of various activities of the organization.

A report was submitted for the Market Development Committee describing the activities of that committee in promoting the showing of the society's motion picture, "This Moving World," and also covering a new program initiated by the committee offering copies of the society's handbook, *American Malleable Iron,* free of charge to senior and graduate engineering students, and to young engineers just entering industry. These offers have met thus far with a phenomenal response. Demand for the movie is still strong and at present it is scheduled for showing in several hundred vocational schools throughout the country.

W. A. Kennedy, chairman of the society's Technical Council, and J. H. Lansing, technical and research director, reported on the progress made to date on the society's research project at Cornell University. The study of gating and feeding of malleable iron castings is just well under way and offers most interesting prospects. It is anticipated that a more accurate estimate as to the probable outcome can be expected at the annual meeting in June.

Arthur F. Jackson, one of the society's representatives on the National Castings Council, reviewed the purpose and activities of the council and announced that the society's board had endorsed the new AFS program on safety and hygiene, and would recommend to the membership that financial support be given to this activity.

President Cal C. Chambers presented an interesting and stimulating discussion entitled "The Challenge of the Future." In his speech, Mr. Chambers reviewed the statistical position of the industry and pointed out that the whole ferrous castings industry had lost ground in the past few years and that only aggressive and constant sales effort could be expected to bring the industry back to its rightful position.

Robert L. Kahn of the University of Michigan, Human Relations Program, Service Research Center, spoke on the subject, "What Motivates the Worker." This was an interesting presentation of the results of continuing studies by the center concerning the reasons for high and low productivity among workers, and factors affecting morale.

According to Mr. Kahn, it has been clearly demonstrated that high production work groups are generally led by supervisory personnel who spend the greatest amount of time in supervisory work as distinguished from those who spend a great amount of time on direct labor or are distracted by paper work. It also appears that the best results are obtained by supervisors who are willing to delegate authority and keep a rather loose rein on the men under them as distinguished from the groups where the leaders are unwilling to delegate authority and are inclined to "over-supervise."

Hon. Lawrence H. Smith, member of Congress from Racine, Wis., spoke at luncheon on "Foreign Affairs and Our National Economy." Mr. Smith is a member of the House Foreign Affairs Committee.

Mr. Smith raised this very vital question, "How far can we commit and extend ourselves in policing the world against the threat of Communism?" While he did not directly answer the question, it was apparent from his remarks that he and many

(*Concluded on page* 172)

CANADIAN MALLEABLE INSTITUTE: Participants in a meeting of the Canadian Malleable Institute at Mount Stephen Club, Montreal, Jan. 9, included: Front row, left to right—J. A. Pennell, Canadian Car & Foundry Co. Ltd., Brantford, Ont.; E. E. Hampson, Canadian Car & Foundry Co. Ltd., Montreal, Que.; S. J. Frame, secretary, Canadian Malleable Institute, Toronto, Ont.; W. H. Cantelon, Auto Specialties Mfg. Co. (Canada) Ltd., Windsor, Ont., and chairman of the institute; Col. Cal C. Chamber, Texas Foundries Inc., Lufkin, Tex., and president, Malleable Founders' Society; Lowell D. Ryan, managing director, Malleable Founders' Society, Cleveland, T. A. Rice, International Harvester Co. of Canada Ltd., Hamilton, Ont. Back row, left to right—J. A. Rumgay, Bowmanville Foundry Co. Ltd., Bowmanville, Ont.; J. Curzon, International Malleable Iron Co. Ltd., Guelph, Ont.; F. O. Peterson, Smiths Falls Malleable Castings Ltd., Smiths Falls, Ont.; H. R. Burgess, International Malleable Iron Co. Ltd., Guelph; E. R. Gifford, McKinnon Industries Ltd., St. Catharines, Ont.; E. N. Noseworthy, Smiths Falls Malleable Castings Ltd.; D. M. Storie, Fittings Ltd., Oshawa, Ont.; H. G. Palmer, Fittings Ltd.; L. H. Layzeil, Canadian Car & Foundry Co. Ltd.; Arthur R. Davies, Ontario Malleable Iron Co. Ltd., Oshawa; T. T. Arnold, Smiths Falls Malleable Castings Ltd.; F. D. McNaughton, Crane Ltd., Montreal

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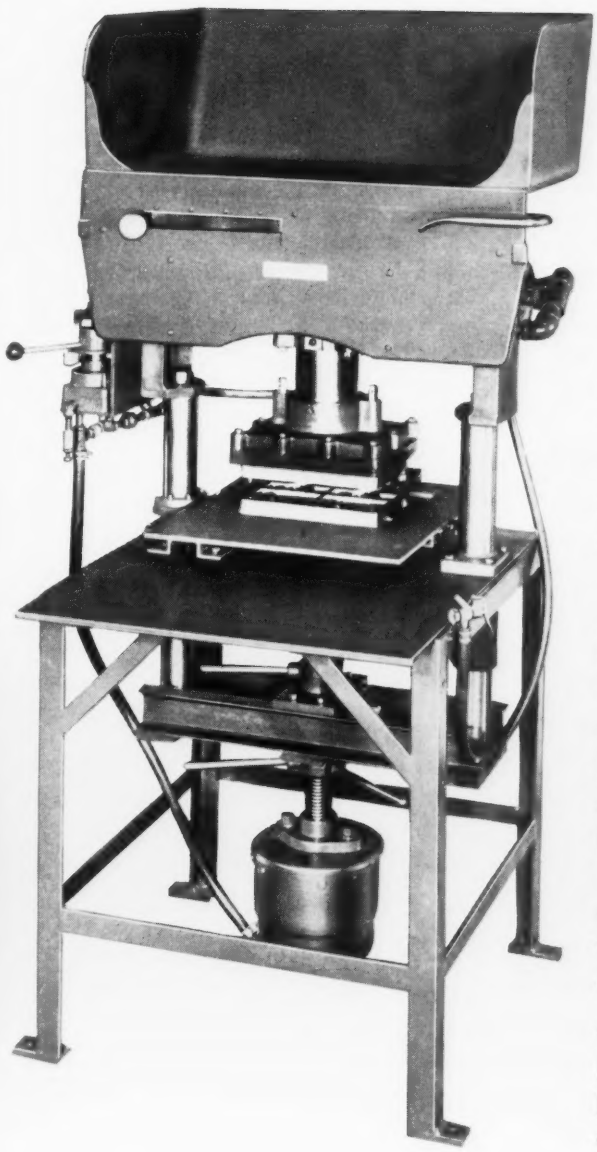

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Stationary sand magazine and long lead on draw table shaft assure accurate draw.

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(*Concluded from page* 170)

other members of Congress feel that we have already over-extended ourselves, and the time has come to re-examine our whole foreign policy in the light of what our economy can stand. According to Congressman Smith, many people lose sight of the fact that our commitments will be worthless if we do not keep a strong economy at home, and that we have about reached the limit of taxation and expenditure for foreign commitments if we are to preserve a strong economy.

Hardware Castings

(*Concluded from page* 101)

cut-off machine. Gate stubs and other undesired projections on the castings are ground off on two-wheel stand grinders, and in some cases on disk-type grinding machines.

Earlier it was mentioned that many of the firm's castings are sold in the plated or polished finish, but other finishes also are applied. One is obtained by tumbling the castings in water with small pieces of scrap, shot, etc., which results in shiny, lustrous appearance commonly known as burnished. A satiny, dull finish is obtained by tumbling in a mixture of fine abrasives and water. Equipment for producing these finishes is located at one end of the sawing and grinding department.

Most of the cores used in the castings produced by Attwood are small and are produced mainly on the bench, although some are made on a small core blowing machine. Sand for the cores is mixed in a paddle-type machine located in one corner of the department adjacent to a sand storage bin. The cores are baked in either of two shelf-type ovens. After baking the cores are inspected, cleaned, and assembled, if required, and then stored on racks in the core-room, or taken to the molding stations in boxes.

In conjunction with its foundry department, the firm also operates a small but completely equipped wood pattern shop, since many of its line of marine and other hardware are of the firm's own design. The pattern shop is located on a mezzanine overlooking the machine shop department in the adjoining bay. The firm's large stock of patterns is stored on a mezzanine adjoining the pattern-shop, but located in the foundry department.

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Announce ASTM Lectures

Fiftieth anniversary meeting of American Society for Testing Materials to be held in New York during the week of June 23 will be highlighted by the Gillett and Marburg lectures to be presented June 23 and 25, respectively. Gillett lecture will be presented by N. L. Mochel, Westinghouse Electric Corp., East Pittsburgh, Pa., and his subject will be "Man, Metals and Power". Speaker at the Marburg lecture will be Dr. R. C. McMaster, Battelle Memorial Institute, Columbus, O., and his subject "Non-destructive Testing".

Book Review

Metallizing Handbook, by H. S. Ingham and A. P. Shepard, cloth, 249 pages, 6 x 8½ in., published by Metallizing Engineering Co., Long Island City, N. Y. Price $3.

Technical and practical aspects of the metallizing process are discussed in this fifth edition. Methods of preparing surfaces for receiving sprayed metal coatings and the application of coatings for machine element work, for corrosion work, and for special production jobs are covered. Supplementary information also is included.

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New Methods for Testing

MACHINABILITY of GRAY

By EDWARD A. LORIA
Senior Engineer Metallurgy
Research and Development Department
Carborundum Co., Niagara Falls, N. Y.

EVERY engineer and metallurgist concerned with the economics of metal processing is aware of the need for acceptable procedures for evaluating machinability. It is an elusive property to measure because of the complexity of factors involved. In the case of cast iron, it has been shown that microstructure has a predominant influence on machinability[1]. The microstructure is controlled by the composition and thermal history of the iron. The rate of cooling from the liquidus temperature is the principal factor influencing the mode of the graphite and matrix structure. Since cooling rates vary with section thickness, different parts of a casting may exhibit significantly variant microstructures. This accounts for the occurrence of "hard spots" and machining difficulties in thin sections of some gray iron castings.

The properties of interest in machining have to be evaluated by a cutting operation. To be useful the cutting operation selected for an investigation must simulate the machining operation of interest commercially. Of the several different criteria for machining performance of any material, tool wear between cuts is often considered of the most importance as a basis to predict performance in the shop. Also, in any free cutting material, the feed, or the distance of tool advance per spindle revolution, is an important measurement which is sensitive to small differences in machinability. This article will present results from two lathe test methods which are based on these criteria.

The first method evaluates the machinability of individually cast, thin section rings on the basis of tool wear after light cuts at commercial speeds. The second method evaluates the machinability of individually cast round bars on the basis of the feed resulting from a fixed, horizontal tool pressure using, with some

TABLE I—Summary of Data on Practice Tests on Cast Iron from Arbitration Bars with Constant Pressure Lathe

(R Values for Test Indicated)

	—Condition A—			—Condition B—			—Condition C—				—Condition D—		
Number	Tool 10	Tool 11	Tool 12	Tool 7	Tool 8	Tool 9	Tool 4	Tool	Tool 6	Tool	Tool 1	Tool 2	Tool 3
1							20.6	20.5	20.4	24.2	28.2	30.2	37.6
2	19.6	24.0	38.5	16.5	19.8	18.0							
3	23.0	21.7	34.6	17.2	20.1	18.5							
4	26.4	19.9	29.8	18.1	20.4	18.8							
5							20.6	22.0	22.5	22.4	32.2	25.6	19.4
6	37.0	16.4	28.1	22.9	20.0	18.8							
7							21.4	22.1	19.7	26.5	64.8	46.4	26.5
8	30.0	15.1	15.7	22.0	19.4	19.7							
9	27.6	29.7	20.4	25.6	21.4	19.1							
10	38.0	20.5	15.8	22.6	21.2	18.8							
Av. R	28.8	21.0	26.1	20.7	20.3	18.8		21.2	22.6		41.7	34.1	27.8
Number of Observations	7	7	7	7	7	7		6	6		3	3	3
Standard Deviation	6.3	4.5	8.4	3.16	0.68	0.45		0.68	2.3		16.3	8.9	7.3
Coefficient of Variation, %	21.9	21.5	32.0	15.3	3.3	2.4		3.2	10		39.1	26.1	26.2

Test Condition A: Cast surface (1.2-in. diam.) turned down to 1 in., 107 rpm., 31 msfm. 81 lb thrust. Test Condition B: ⅛-in. turning cut on 1 in. rounds, 140 rpm, 32 msfm, 81 lb thrust. Test Condition C: ⅛ in. turning cut on ⅞ in. rounds, 171 rpm, 33 msfm, 81 lb thrust. Test Condition D: Cast surface(1.2-in. diam.) turned down to 1 in., 287 rpm, 82 msfm, 81 lb thrust.

R = average number of spindle revolutions occurring during 0.1 in. tool travel. The feed corresponds to 0.1 ÷ R.

Coefficient of Variation = root-mean-square deviation of readings ÷ average reading.

Fig. 3—Tool wear data on machining ½-in.-thick rings at depth of 1/16-in. below as-cast surface. Composition of silicon-carbide-treated iron was 3.32-3.42% TC, 2.04-2.18% Si, 4.00-4.12% CE. Untreated iron composition was 3.34-3.46% TC, 2.12-2.20% Si, 4.05-4.18% CE

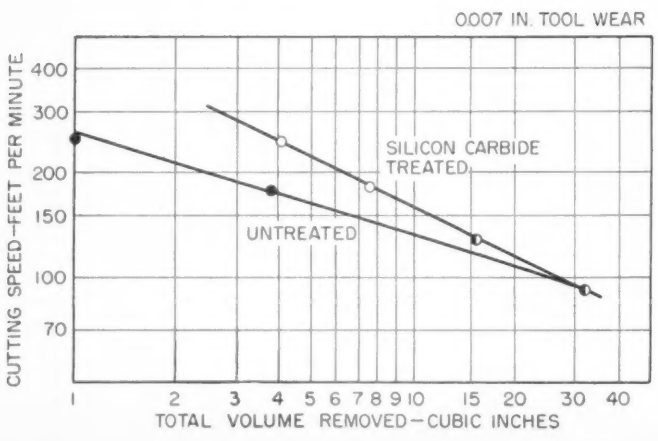
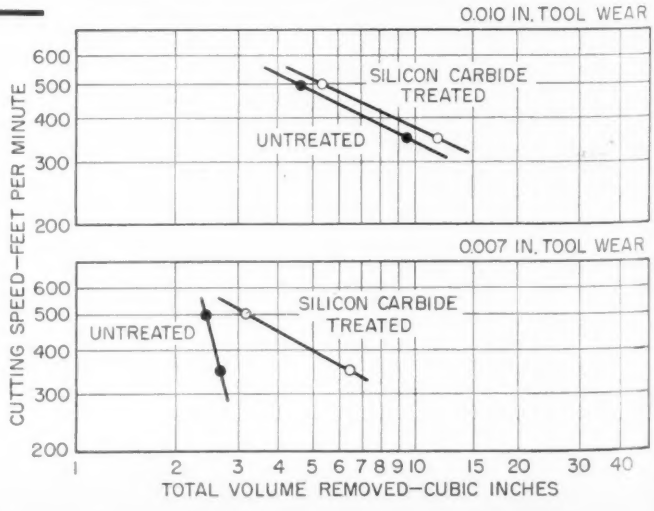


Fig. 4—Tool wear data on machining ½-in.-thick rings described in Fig. 3 at ⅛-in. below as-cast surface



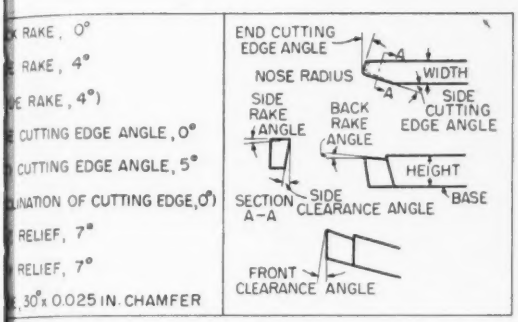


Fig. 1—Shape of carbide tools used in wear test on cast iron

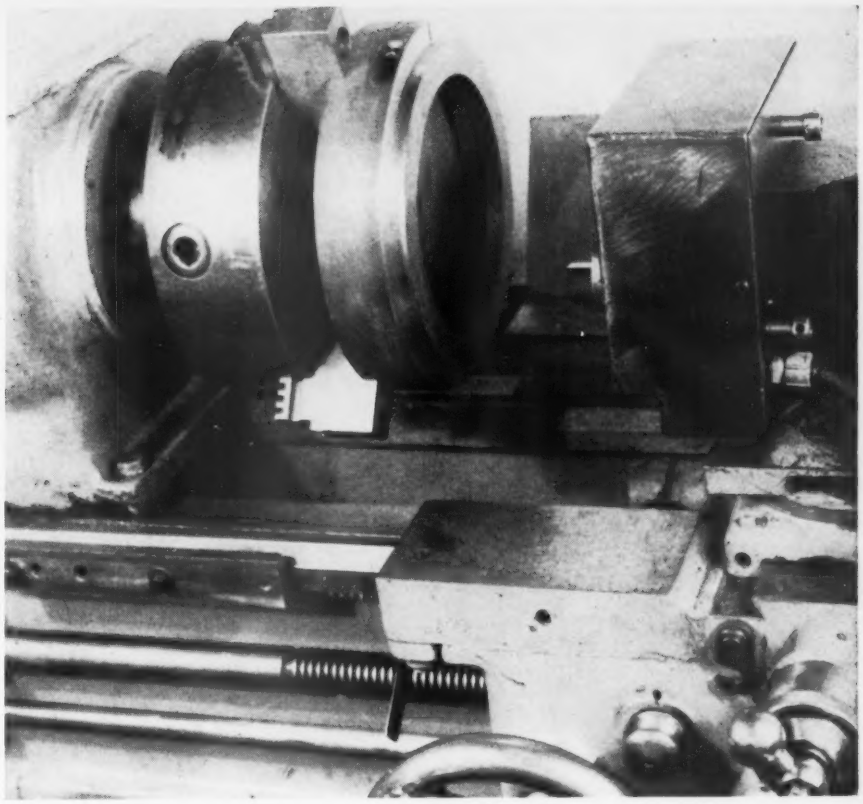


Fig. 2—Gray iron test rings are mounted in a special chuck. Carbide tool is mounted in a tool post dynamometer and makes test cuts across casting

modifications, the constant pressure lathe test developed by Battelle Memorial Institute for measuring the machinability of free-cutting steels.[2]

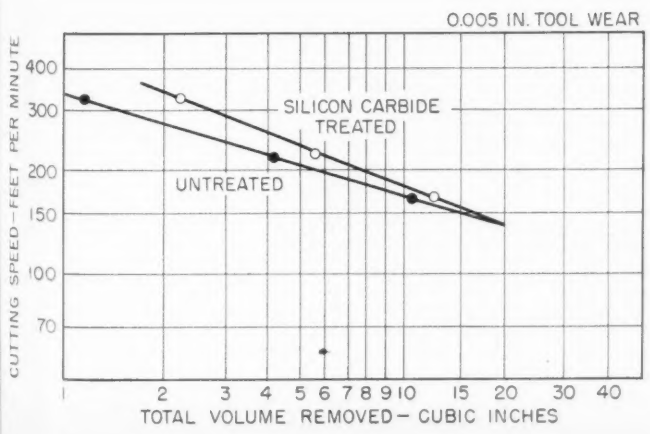
The test specimens were automotive grade cast irons obtained in production foundries and the machining data were furnished by Battelle Memorial Institute. The tool wear test method was developed previously in cooperation with the Cincinnati Milling Machine Co. Research Laboratory where the initial results were obtained[3]. Since tool wear in machining a thin section is being measured in one test, a large number of rings of similar chemistry were required. These rings of 7 in. ID, 9 in. OD and ½-in. thickness were individually cast in core in order to eliminate the variable effect of moisture on the surface structure of green sand castings. The specimens selected for the second test were 1.2 in. and ⅞-in. rounds cast in core and following the same procedure devised for the casting of arbitration bars.

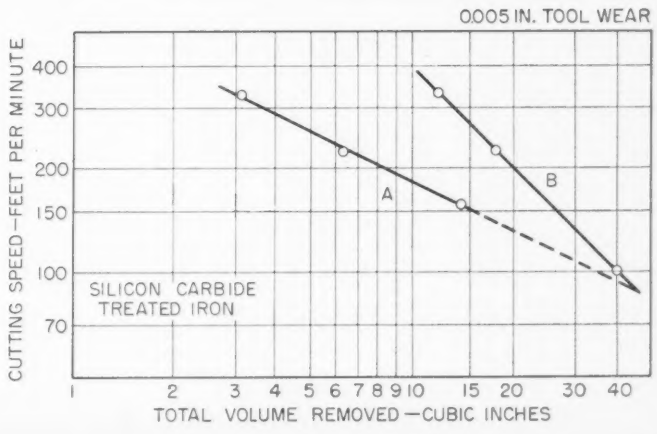
Tool Wear Test—Because large tonnages of cast iron go into relatively thin castings which are machined only on the surface, a test which would make light surface cuts at commercial speeds on samples, whose thickness could be varied to give different cooling rates, would be of considerable value. The ring dimensions chosen provided sufficient surface area for tool wear measurements and the ½-in. thickness produced cooling conditions comparable to those occurring in thin-section castings. In such sections, the cutting tool is removing only the as-

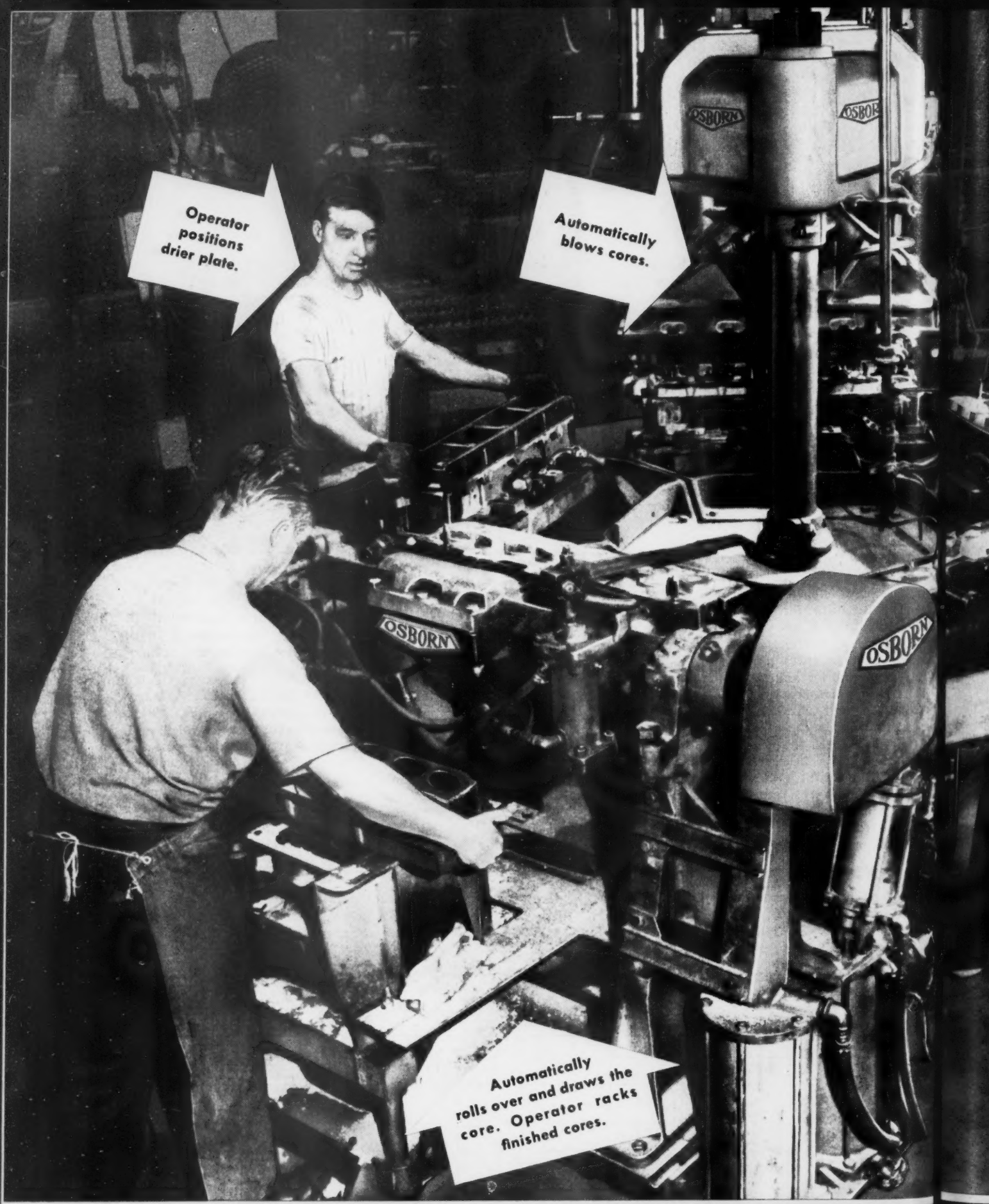
(*Continued on page* 178)

Fig. 5—Tool wear data on machining ½-in.-thick-rings 1/16-in. below as-cast surface. Composition of silicon-carbide-treated iron: 3.45-3.56% TC, 1.86-2.12% Si, 4.12-4.19% CE. Untreated iron: 3.47-3.56% TC, 1.79-2.13% CE

Fig. 6—Tool wear data on machining (A) ¼-in.-thick rings and (B) ½-in.-thick ring of silicon-carbide-treated iron at 1/16-in. below as-cast surface. Composition: 3.38-3.49% TC, 2.49-2.74% Si, 4.29-4.35% CE







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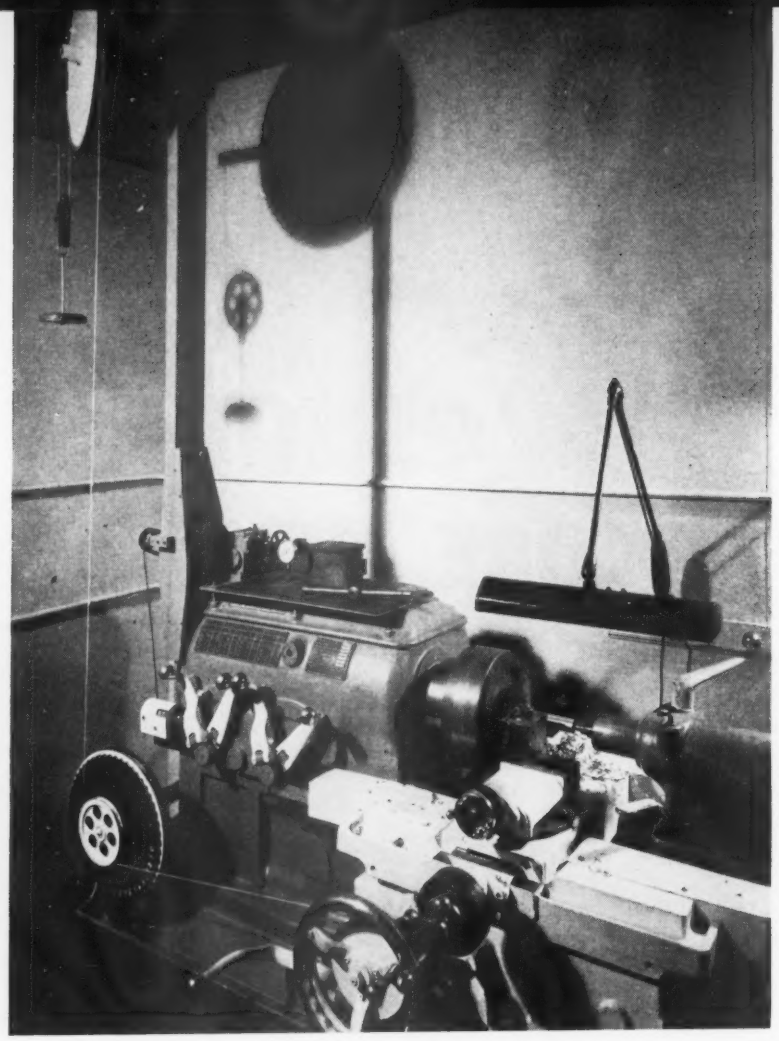

Fig. 7—Machinability test in progress on constant pressure lathe

(*Continued from page* 175)

cast surface plus a shallow cut into the underlying metal. Since the microstructure of cast iron is quite sensitive to variations in rate of cooling, the outer skin of castings is usually less easily machined than the interior and most responsible for tool wear.

The machining tests on the rings were made on a 14-in. engine lathe. To solve the chucking problem a special chuck was made that clamped the rings round their entire periphery. The inner and outer cylindrical surfaces of each ring were ground to give accurate control of area and smooth entry of the tool across the work face. The special chuck was carried in a three-jaw chuck attached to the spindle of the lathe, as in Fig. 2. A test ring was clamped in the chuck and cuts were taken alternately on cope and drag faces with a carbide tool. No test ring was machined on both faces in the same test. This served to average out any individual differences between test rings and faces.

Adopt New Methods

Single point Carboloy, grade 44A, tools were used and they were ground to the geometry given in Fig. 1. The 30° x 0.025 in. chamfer on the nose was the form found best in practice tests and the surface roughness on the ground tool was 7-8 microinch, as determined by a profilometer. Tests were run at three or more speeds to obtain cutting speed vs. tool life data on the various castings.

A nominal depth of cut of $\frac{1}{16}$-in. was used with a feed of 0.010-in. per revolution. The flank wear on the tool after each cut was measured by a 100-power microscope at a location 0.005-in. from the chamfer. This wear was expressed in terms of the volume of metal that could be removed before the wear land reached a width of 0.005-in., 0.007-in. or 0.010-in. Tests stopped at any of these values require less material and correlate well with those run to a full 0.030-in. wear land which represents complete failure for carbide tools.

Tool wear results for three separate investigations are shown in Figs. 3 to 6, the data producing straight lines when the volume of metal removed is plotted against the mean surface speed on logarithmic coordinates. The sensitivity of the test method to structural variations in pearlitic cast irons is shown by the comparison of irons of similar chemistry and section when melted with

(*Continued on page* 180)

TABLE II—Machinability Data for 1-in. Round Cast Iron Bars Tested with Constant-Pressure Lathe

Bar Number	"R" Values for Test Indicated						Average "R" Value	Standard Deviation	Coefficient of Variation, %	Machinability Index
	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6				
FC3	12.4	14.9	14.8	14.9	13.8	14.1	14.1	0.87	6.2	127
FC13	12.6	13.8	14.2	14.5	13.5	14.4	13.8	0.65	4.7	130
FC15	11.8	12.3	13.3	14.1	12.6	12.9	12.8	0.73	5.7	140
FC7	13.6	12.3	13.8	13.9	13.5	13.5	13.4	0.53	3.9	134
FC17	14.1	12.8	15.6	13.8	12.4	13.3	13.7	1.03	7.5	130
FC9	13.3	12.6	13.2	15.4	13.7	13.1	13.5	0.88	6.5	133
FC18	14.0	13.3	13.7	15.1	15.0	13.0	14.0	0.79	5.7	128
FC1	13.7	13.3	13.3	15.0	13.2	12.1	13.4	0.86	6.4	134
FC14	15.2	13.9	13.6	14.1	13.9	13.8	14.1	0.52	3.7	127
FC16	13.4	11.8	13.1	12.8	13.1	11.8	12.7	0.65	5.1	141
Standard	18.0	18.1	18.9	18.6	16.7	17.0	17.9	0.79	4.4	100

Testing Conditions: Cast bars 1.2-in. diam turned to 1.0-in. rounds, before testing at 140 rpm.; 32 mean surface feet per minute; thrust force of 81 pounds; depth of cut ⅛ in.

The machinability indexes are based on a standard B1112 cold-drawn steel given an arbitrary rating of 100. Machinability index = 100x "R" on standard ÷ "R" on unknown.

TABLE III—Machinability Data for 0.825-in. Round Cast Iron Bars Tested with Constant-Pressure Lathe

Bar Number	"R" Values for Test Indicated						Average "R" Value	Standard Deviation	Coefficient of Variation, %	Machinability Index
	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6				
FC3	14.9	16.8	18.4	16.7	16.7	15.3	16.5	1.1	6.9	133
FC13	19.7	16.4	19.3	17.1	17.6	16.2	17.7	1.3	7.5	125
FC15	16.6	15.1	15.7	15.7	16.1	15.2	15.7	0.51	3.2	140
FC7	15.1	16.4	16.8	15.7	16.0	15.4	15.9	0.57	3.6	137
FC17	16.7	16.6	17.9	14.8	15.6	18.4	16.7	1.24	7.4	131
FC9	17.5	15.8	13.6	16.3	16.4	16.2	15.9	1.20	7.4	137
FC18	17.3	15.1	16.9	16.0	16.6	15.2	16.2	0.84	5.2	135
FC1	20.0	14.9	16.9	15.6	16.2	15.4	16.5	1.73	10.5	132
FC14	18.0	14.3	16.5	15.8	16.5	14.1	15.9	1.3	8.2	137
Standard	17.9	21.3	24.9	22.1	22.2	23.5	22.0	2.29	10.3	100

Testing conditions: Cast bars 0.875 in. diam turned to 0.825-in. rounds, before testing at 171 rpm; 31 mean surface feet per minute; thrust force of 81 pounds; depth of cut ⅛-in.

The machinability indexes are based on a standard B1112 cold-drawn steel given an arbitrary rating of 100. Machinability index = 100x "R" on standard ÷ "R" on unknown.

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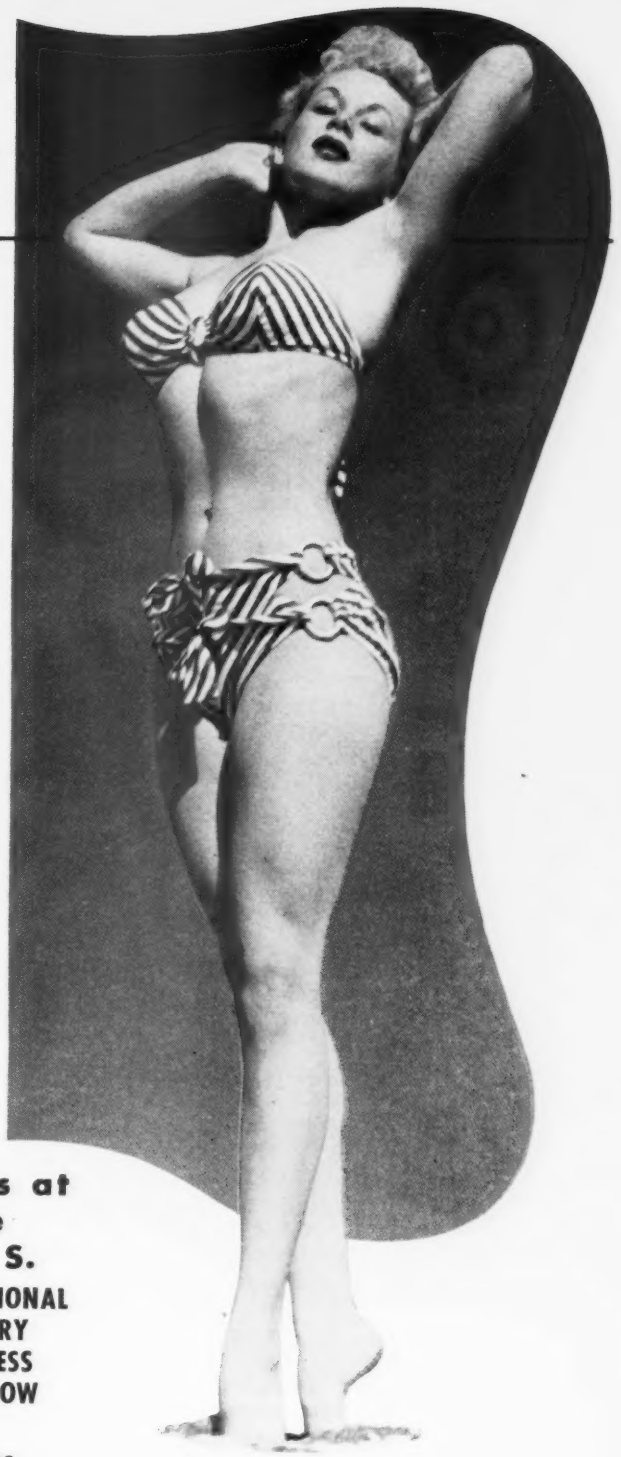

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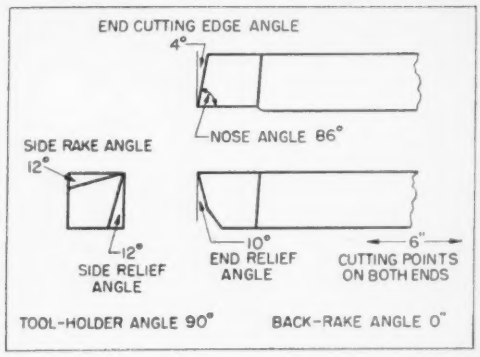

Fig. 8—Shape of steel tools used in the constant-pressure tests on cast iron bars

(*Continued from page* 178)

and without the cupola addition of silicon carbide briquets. Generally, the effect of adding these briquets is to produce a more uniform graphite structure and to prevent the formation of hard spots or chill areas.

This test method is sensitive enough to show the beneficial effect of such inoculating additions on the machinability of cast iron, and the difference becomes more pronounced at higher cutting speeds. The results on machining the as-cast surface of a series of ½-in. thick rings of 4.00-4.18 per cent carbon equivalent to a depth of $\frac{1}{16}$-in. are shown in Fig. 3. The results on machining the same rings to a depth of ⅛-in. below the original surface are given in Fig. 4. The microstructure of the rings at this level is somewhat different than at the surface and this, together with the higher machining speeds used in this test, accounts for the different slopes of the lines.

At high speeds the initial wear on the tool (under 0.005 in.) was usually nonuniform, and it was necessary to go to a wear land beyond 0.005-in. for reproducible results. In a second, extensive investigation of automotive grade iron, the test was used to rate the machinability of ½-in. thick rings of 4.12-4.22 per cent carbon equivalent with the results shown in Fig. 5. In order to ascertain the machinability of softer iron to be cast into very thin sections, ¼-in. thick rings were cast in another foundry and tested in the same manner. Fig. 6 shows the results on machining ¼-in. and ½-in. thick rings of such iron having a 4.29-4.35 per cent carbon equivalent.

Constant Pressure Test—The need for meeting production requirements suggests a machinability test that would give information on tool travel, for a constant feed load. Even in a free-cutting material such as cast iron, specimens of different machining quality cut at different rates, for constant surface speed, when a fixed lateral pressure is applied to the tool. The second test method is based on this principle, and the ratings hinge on the assumption that an iron with superior machinability will cut with a heavier feed than one of poorer machinability when a fixed pressure is used to produce tool travel. As shown in Fig. 7, it consists basically of a lathe with a tool carriage disconnected from the fixed-feed mechanism and mounted on ball bearings; a means of applying a predetermined lateral tool pressure; and a device for recording the number of spindle revolutions occurring during a certain distance of tool travel.

Again, since differences in feed or tool advance in this test are intrinsically related to microstructural differences in test specimens and since a large majority of tests on free-cutting steels were turning tests on ⅞-in. rounds, individually cast 1.2-in. and ⅞-in. rounds were selected in adapting the method to the machinability rating of cast iron on the basis of chemistry and cooling conditions on solidification. To illustrate the nature of the macrostructure being machined in this test, Fig. 9 is presented. It shows the cross sections of low, medium and high carbon equivalent, 1.2-in. diameter bars and the effect of higher silicon content in reducing the cell size of cast iron.

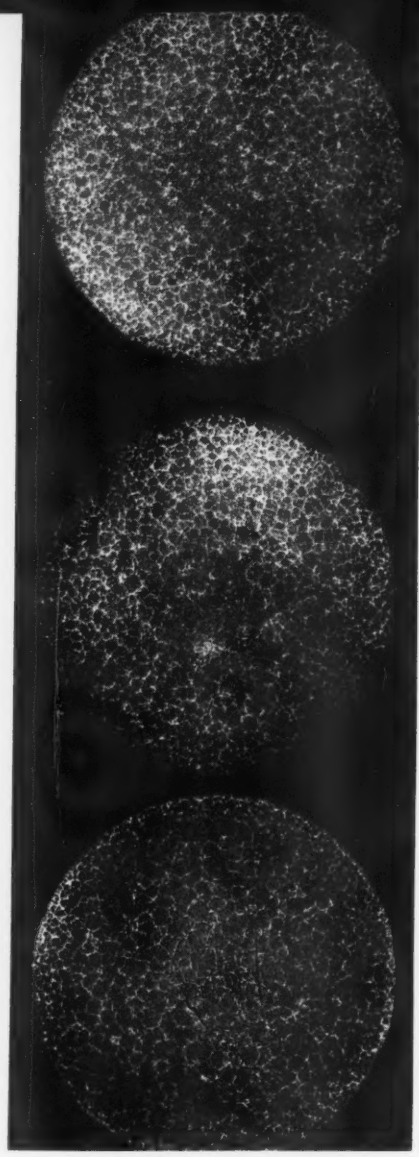

Fig. 9—Macrostructure of 1.2-in. arbitration bars of low, medium and high carbon equivalent for machining tests on constant-pressure lathe. Nital etch. Top: 3.39% TC, 1.70% Si, 3.96% CE. Center: 3.45% TC, 1.79% Si, 4.05% CE. Bottom: 3.60% TC, 1.88% Si, 4.22% CE

TABLE IV—Summary of Machinability Ratings for Cast Iron Bars in Constant Pressure Lathe Tests

Bar Number	Chemical Analysis TC	Si	CE	Machinability Index 1.2 in.	⅞ in.
FC3	3.25	2.06	3.94	127	133
FC13	3.30	2.06	3.99	130	125
FC15	3.49	2.19	4.22	140	140
FC7	3.35	2.30	4.12	134	137
FC17	3.35	2.27	4.11	130	131
FC9	3.33	2.08	4.02	133	137
FC18	3.39	2.07	4.08	128	135
FC1	3.39	2.07	4.08	134	132
FC14	3.37	1.97	4.03	127	137
FC16	3.46	1.97	4.12	141	140

Details of the testing procedures have been published by the originators of the test and will be mentioned here only briefly[2]. A test consists of cutting a standard material and several unknown samples, for a distance of 2 in., with the same tool. To compensate for unintentional variations in tool conditions, machinability ratings are based on tests with six tools which are regular high-speed steel ¾-in. square blanks ground to the shape shown in Fig. 8. Considerable care must be exercised in preparing tools in order to get reproducible results, and they are reground before appreciable wear occurs. For steel, the depth of cut is usually fixed at ⅛-in., the spindle speed at 377 rpm and the feed load at 81 lb.

To facilitate comparisons between samples tested at different times and to reduce the effect of slight differences in tool conditions, a ⅞-in. round from a special lot of B1112 cold-drawn steel is tested in any series and used as a reference standard. It is considered to have a machinability index of 100 in all tests. The ratings are calculated from the average number of spindle revolutions during test on standard B1112 steel for a 2-in. cut divided by the average number of spindle revolutions during test on unknown iron for a 2-in. cut, the result then being multiplied by 100.

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(*Concluded on page* 182)

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(*Concluded from page* 180)

iron, the limits within which data can be reproduced in tests on the same iron and the significance to be attached to differences in ratings between several irons were explored. A number of 1.2-in. diameter bars were procured from the same ladle of molten iron and assumed to be replicate specimens, having an analysis spread of only 3.22-3.24 per cent total carbon, 3.94-3.95 per cent silicon. Data obtained on these bars when modifying the constant pressure lathe test for reproducible results are listed in Table I.

Tests were first made under conditions suitable for testing steel, denoted as condition D; for this test, surface cuts were made on the as-cast bars. The observations showed too much scatter to be useful for rating machinability, the coefficient of variations ranging from 26 to 39 per cent. Furthermore, the rate of cutting varied considerably when successive tools, of the same shape, were used and the tools showed some wear after these tests. Tests were next made under Condition A, using a lower surface speed on essentially the as-cast surfaces of the bars. The reduction in cutting speed improved the life of the tools considerably. However, the scatter in R values was still bad and the coefficients of variation ranged from 21 to 32 per cent. Therefore, it did not seem likely that as-cast bars would give reliable and reproducible results. The trouble seemed inherent in the fact that arbitration bars are not perfect rounds with smooth surfaces. Both characteristics made them difficult to chuck so that the cut will be concentric and uniform in depth.

Tests were then made on bars machined to uniformly sized rounds. Data in Table I for Conditions B and C give the results on 1-in. and ⅞-in. diameter bars. There is comparatively little scatter in R values and the coefficients of variation were less than 10 per cent. Since the surface speeds were about the same and the tools identical, the data for Conditions B and C can be considered as a group. They show that the average R value for 33 cuts and 10 bars using 5 tools was 20.5. This corresponds to a feed of 0.00488-in. produced by a thrust of 81 lb on a turning tool taking a cut ⅛-in. deep. The coefficient of variation was 10 per cent, which is as good as the normal reproducibility for tests on steel.

Conditions suitable for testing gray iron bars include a speed of 30-35 fpm and a tool thrust of 81 lb for a ⅛-in. turning cut. To determine the variations in a set of gray irons, castings were made in two sizes: 1.2-in. rounds 21 in. long, and 0.87-in. rounds 15 in. long. The bars were machined to 1-in. or $\frac{13}{16}$-in. rounds to insure concentricity for testing. Bars of the same size were tested in a series of tests with the same tools. Two series of tests, each involving the use of six tools, were made, and a piece of B1112 cold-drawn steel was tested with each group. The data are listed in Tables II and III. The respective chemical analyses and machinability ratings, based on B1112 steel as 100, are summarized in Table IV.

The reproducibility of machinability data for cast iron by this test method is shown in Tables II and III. In these tests, the coefficient of variation averages only 6.1 per cent. The measurements have the same order of reproducibility as those for most steels. Table IV shows that the machinability ratings for the larger 1.2-in. diameter agree quite closely with those for the ⅞-in. diameter castings. This also indicates testing conditions were closely controlled. The bars represent a small range in composition and, as expected, the ratings tend to improve with increasing carbon equivalent or total carbon content. This method is now being used to detect effects of Ferrocarbo silicon carbide and other graphitizing additions on gray iron machinability.

References

1. R. LeGrand, "Air Force Report Proves Machinability Depends on Microstructure," *American Machinist,* vol. 94, November 1950, pp. 109-124.
2. F. W. Boulger, H. L. Shaw and H. E. Johnson, "Constant-Pressure Lathe Test for Measuring the Machinability of Free-Cutting Steels," *Transactions,* ASME, vol. 71, July 1949, pp. 431-446.
3. E. A. Loria and R. L. Keller, "A Machinability Test for Gray Iron Castings," *Iron Age,* vol. 165, June 1950, pp. 73-76.

Editor's Note: A second article by Mr. Loria, incorporating results of machining tests on a large number of individual cast bars of varying chemical composition, will be presented in an early issue.

Meetings of Interest to Foundrymen

Mar. 3-7—American Society for Testing Materials, spring meeting, Statler Hotel, Cleveland

Mar. 7—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

Mar. 18-19—Steel Founders' Society, annual meeting, Edgewater Beach Hotel, Chicago

Mar. 28—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Mar. 31-Apr. 2—American Institute of Mining & Metallurgical Engineers, national open hearth conference, William Penn Hotel, Pittsburgh

Apr. 10-11—Malleable Founders' Society, market development conference, Case Institute of Technology, Cleveland

Apr. 11-12—Health Protection in Foundry Practice, School of Public Health, University of Michigan, Ann Arbor, Mich. H. E. Miller, director of continued education

Apr. 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Apr. 27-May 1—American Ceramic Society, annual meeting, William Penn Hotel, Pittsburgh

May 1-7—Non-Ferrous Founders' Society, annual meeting, Atlantic City, N. J.

May 6-9—International Lighting Exposition and Conference, Public Auditorium, Cleveland

May 14-16—Society for Experimental Stress Analysis, spring meeting, Lincoln Hotel, Indianapolis

May 16—Malleable Founders' Society, eastern sectional meeting, Commodore Hotel, New York

May 22-24—American Society for Quality Control, annual convention and exhibition, Onondaga County War Memorial Auditorium, Syracuse, N. Y.

May 23—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

June 16-17—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

June 23-27—American Society for Testing Materials, annual meeting, Statler Hotel, and Hotel New Yorker, New York

July 25—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Sept. 8-10—American Standards Association, national standardization conference, Museum of Science & Industry, Chicago

Sept. 8-12—Instrument Society of America, annual meeting, Cleveland

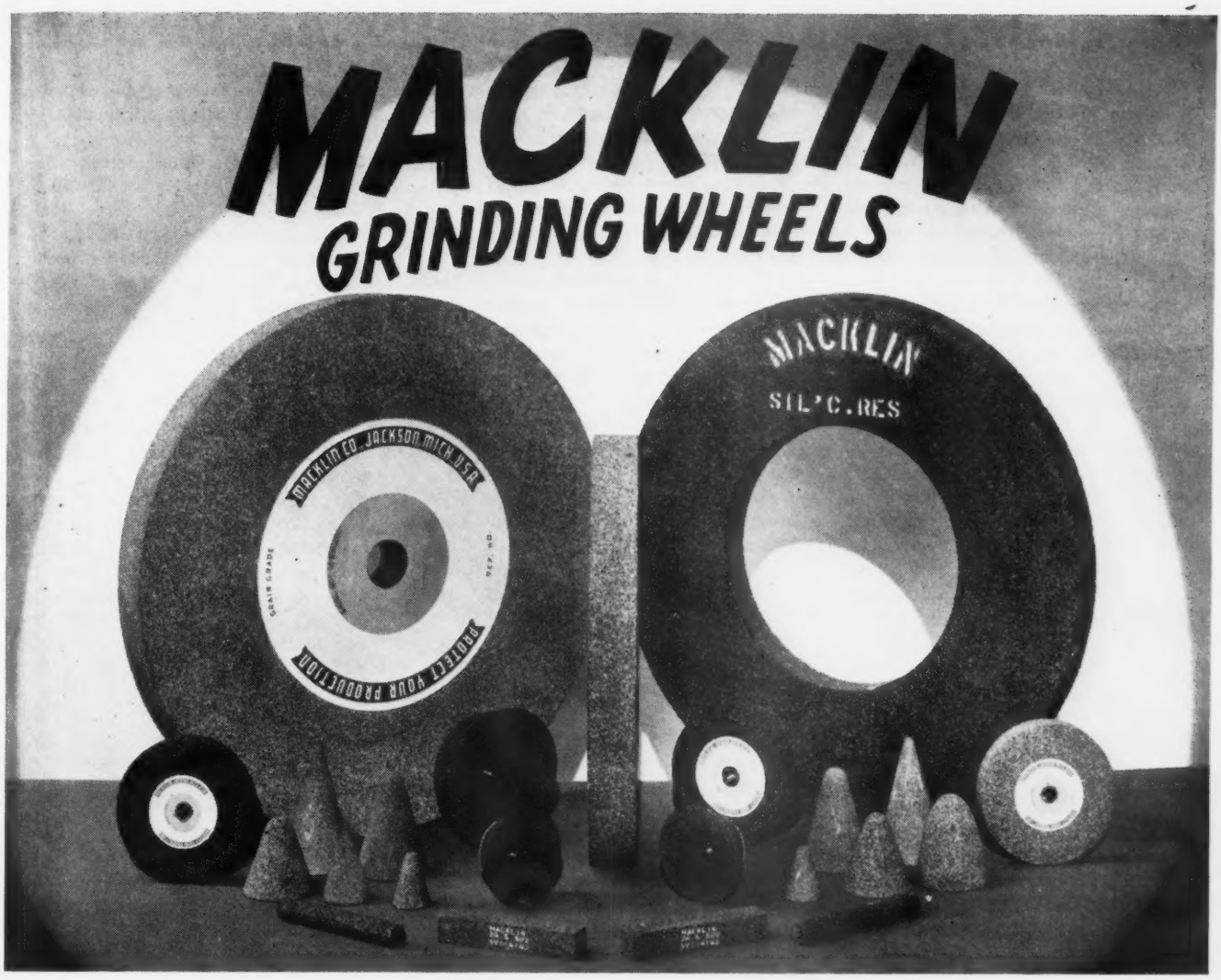
Sept. 22-23—Steel Founders' Society, fall meeting, the Homestead, Hot Springs, Va.

Sept. 26-27—Ohio Regional Foundry Conference, Ohio Chapters, AFS, and Ohio State Student Chapter, Ohio State University, Columbus, O.

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.



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AFS PUSHES PLANS FOR INTERNATIONAL CONGRESS

FINAL plans rapidly are taking shape for the 1952 International Foundry Congress and Show at Atlantic City, N. J., May 1-7. The American Foundrymen's Society, in reporting allotment of all available space in Convention Hall headquarters for the exhibit of equipment and supplies, indicated that the 1952 convention promises to take top ranking in attendance as well as in quality of technical program and equipment displays.

A few minor changes have been made in the tentative program for the week's activities as announced originally last fall. The current tentative timetable for the various technical sessions, luncheons, dinners and other events is shown below.

Arnold N. Kraft, Philadelphia Chapter vice chairman and foundry manager of the Wilkening Mfg. Co., Philadelphia, has been appointed chairman of a plant visitation committee which is arranging for convention visitors' inspection of district foundries. Chartered buses will leave Atlantic City Friday and Tuesday mornings for trips to various plants.

The AFS and the government's Mutual Security Agency jointly are sponsoring an extended tour of American foundry centers for foreign delegates prior to and following the Congress. The main party of visitors from the United Kingdom and other European countries is expected to arrive in New York, Apr. 18. Two separate tours are planned. One group will visit Cleveland, Chicago and Cincinnati before going to Atlantic City for the Congress, followed by a trip to New York and Washington. The other group will include Buffalo, Detroit, Chicago and Pittsburgh on its itinerary, in addition to the week at Atlantic City and a visit to Washington.

Several other foundry organizations are planning meetings during the AFS Congress. The Non-Ferrous Founders' Society will hold its open annual meeting May 1, with a "Son-Father" dinner that evening. Trustees of the Foundry Educational Foundation will have their annual meeting May 5, and the National Foundry Association's executive council has scheduled a meeting to be held May 6.

An entertainment program is being arranged for lady visitors to the convention. It will include the annual AFS tea on May 2, in addition to a sightseeing trip, luncheon and other events. Wives of all past presidents of the society will serve as honorary hostesses during the week, while the Ladies Entertainment Committee will consist of the chairmen of similar committees at the different annual conventions held the last ten years.

These past chairmen include: Mrs. John R. Wark and Mrs. Alfred A. Diebold (Buffalo 1951); Mrs. Frank G. Steinebach (Cleveland 1950); Mrs. A. L. Hunt and Mrs. E. J. AuBuchon (St. Louis 1949); Mrs. H. J. Williams (Philadelphia 1948); Mrs. Harry W. Dietert (Detroit 1947); Mrs. Gilbert J. Nock (Cleveland 1946); Mrs. R. C. S. Potter (Buffalo 1944); Mrs. C. B. Shanley (St. Louis 1943), and Mrs. A. J. Tuscany (Cleveland 1942).

A number of foundry equipment manufacturers plan to introduce new or improved products at the Foundry Show. The displays, all of which will be located on one floor of Convention Hall, will be open throughout the seven days, except for Saturday morning, May 3, when the AFS annual business meeting and Charles Edgar Hoyt annual lecture are scheduled.

On Sunday, May 4, the exhibit will be open without charge to employees of plants in the Chesapeake, Philadelphia and Metropolitan Chapter areas. Exhibits will close at 6:30 p.m. that day. They will be open Friday evening, May 2, but will close at 5:30 p.m. other days except for the final day of the Congress, May 7, when the final closing is 4 p.m.

Tentative Program for 1952 International Foundry Congress and Show

Thursday, May 1—"Defense Day"

8:30 a.m.—Registration opens
9:30 a.m.—Exhibits open
10 a.m.—Non-Ferrous Founders' Society open meeting
11:45 a.m.—Official opening ceremony
12:30 p.m.—Roundtable luncheon meeting—Brass and Bronze
2 p.m.—Technical session—Aluminum and Magnesium
4 p.m.—Technical sessions—Aluminum and Magnesium; Nonferrous Sand Shop Course
5:30 p.m.—Registration and exhibits close
7 p.m.—Non-Ferrous Founders' Society "Son-Father" Dinner

Friday, May 2—"Chapter Day"

9 a.m.—Registration and exhibits open
9:30 a.m.—Buses leave for plant visitations
10 a.m.—Technical sessions—Brass and Bronze, Aluminum and Magnesium, Patternmaking, Sand
12 noon—Roundtable luncheon meetings—Aluminum and Magnesium, Patternmaking
2 p.m.—Technical session—Malleable, Brass and Bronze
3 p.m.—Official AFS Ladies tea
4 p.m.—Technical sessions—Nonferrous Sand Shop Course
5:30 p.m.—Registration closes
7 p.m.—Chapter Officers and Directors dinner
9:30 p.m.—Exhibits close

Saturday, May 3—"President's Day"

9 a.m.—Registration opens
10 a.m.—57th Annual Business Meeting of AFS—Election of officers and directors; apprentice contest awards; welcome to international delegates
11 a.m.—Charles Edgar Hoyt annual lecture
12 noon—Exhibits open
12 noon—Defense Production Luncheon—Nonferrous
2 p.m.—Technical sessions—Brass and Bronze, Aluminum and Magnesium, Patternmaking. International Committee meeting—Foundry Dictionary
4 p.m.—Technical sessions—Malleable Iron, Safety and Hygiene and Air Pollution
5:30 p.m.—Registrations and exhibits close
7:30 p.m.—Annual AFS Banquet—Gold medal awards; presentation of International prize

Sunday, May 4—"International Day"

9 a.m.—Registration opens
10 a.m.—Exhibits open
10 a.m.—Committee meetings including International Committee on Testing Cast Iron
2 p.m.—Committee meetings, including International Committee of Foundry Technical Associations
4:30 p.m.—International reception
5:30 p.m.—Registration closes
6:30 p.m.—Exhibits close
7 p.m.—President's dinner (private)
7 p.m.—Canadian dinner

Monday, May 5—"Management Day"

8 a.m.—National Castings Council annual meeting
9 a.m.—Registration and exhibits open
9 a.m.—Past Presidents' breakfast (private)
10 a.m.—Technical sessions—Gray Iron, Steel, Safety and Hygiene, Time Study and Methods, Malleable Iron, Sand
10 a.m.—Annual meeting, Foundry Educational Foundation trustees
12 noon—Roundtable luncheon meeting—Malleable Iron
12 noon—Defense Production luncheon meeting—Ferrous
2 p.m.—Technical sessions—Chapter Educational Activities, Ferrous Safety and Hygiene and Air Pollution, Plant and Plant Equipment
2:30 p.m.—Ladies international tea and style show
4 p.m.—Technical sessions—Gray Iron Shop Course, Ferrous Sand Shop Course, Education, Costs, Plant and Plant Equipment
5:30 p.m.—Registrations and exhibits close
7 p.m.—Alumni dinner

Tuesday, May 6—"Old Timers Day"

9 a.m.—Registration and exhibits open
9 a.m.—Buses leave for plant visitations
10 a.m.—Technical sessions—Gray Iron, Heat Transfer, Costs, Education
10 a.m.—National Foundry Association executive council meeting
10 a.m.—Ladies sightseeing trip and luncheon
10 a.m.—Old Timers' molding contest
12 noon—Roundtable luncheon meeting—Gray Iron
12 noon—Equipment and Supplies luncheon meeting
2 p.m.—Technical sessions—Steel, Time Study and Methods, Refractories
4 p.m.—Technical sessions—Gray Iron Shop Course, Ferrous Sand Shop Course
5:30 p.m.—Registrations and exhibits close
6:30 p.m.—International Education dinner

Wednesday, May 7—"Exhibitors' Day"

9 a.m.—Registration and exhibits open
10 a.m.—Technical sessions—Gray Iron, Steel, Sand
11 a.m.—Exhibitor Recognition and Award
12 noon—Roundtable luncheon meeting—Steel
12 noon—Presidents' luncheon for Foundry Equipment Manufacturers' Association and Foundry Facing Manufacturers' Association Officials
3 p.m.—Registration closes
4 p.m.—Exhibits close

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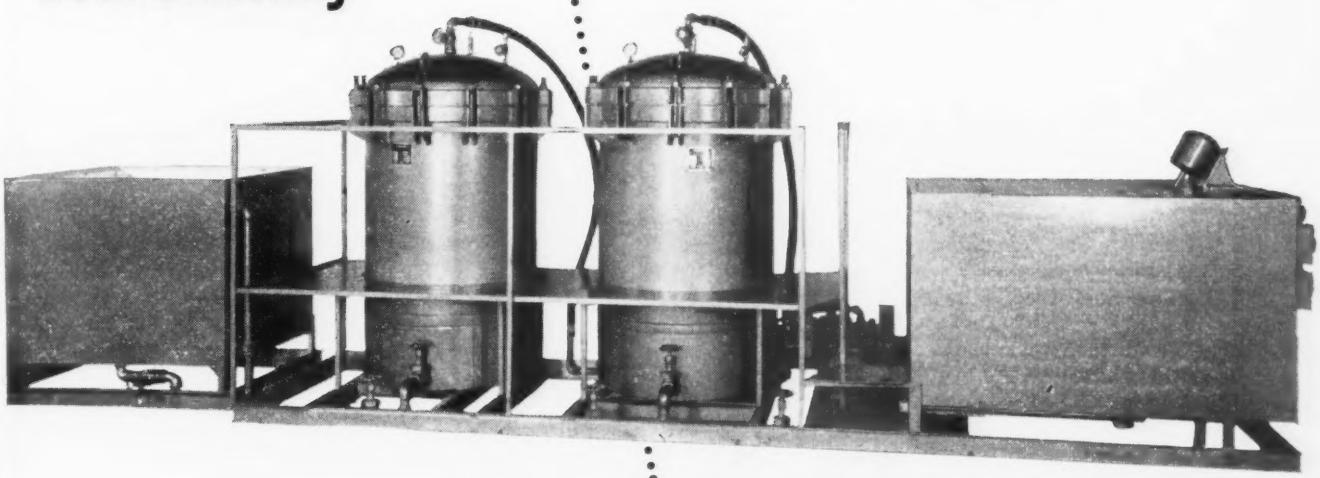

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Activities of Foundry

GROUPS

Connecticut Non-Ferrous

THE following officers were elected at the Jan. 16 meeting of the Connecticut Non-Ferrous Foundrymen's Association held at the Castle Restaurant, New Haven, Conn.; President, Owen Johnson, H. B. Ives Co., New Haven, Conn.; vice president, Stafford W. Chappell Jr., Electric Boat Co., Groton, Conn.; treasurer, Chester Witters, Consolidated Industries Co., West Cheshire, Conn.; secretary, Louis G. Tarantino, Niagara Falls Smelting & Refining Division, New Haven, Conn.; and technical secretary, John V. McCarthy, Federated Metals Division, Hartford, Conn.

Elected to serve on the executive committee are: T. Joseph Judge, Jenkins Bros. Co., Bridgeport, Conn.; J. J. Shannon, Jenkins Bros. Co.; S. W. Chappell Sr., retired; Walter J. Kenney, Knapp Foundry Co. Inc., Guilford, Conn.; D. Wesley Case, Belknap Mfg. Co., Bridgeport.

Technical portion of the meeting was under the direction of Charles Parker, Charles Parker Co., who led a roundtable discussion on various subjects pertaining to foundry practice.—*Louis G. Tarantino, Niagara Falls Smelting & Refining Division.*

Wisconsin

REGULAR meeting of the Wisconsin Chapter of AFS was held Jan. 11 at Hotel Schroeder. A coffee talk by D. W. Melton, representative of Wisconsin Telephone Co., entitled "Skyways," described the transmission of television programs as well as telephone conversations over the air instead of by coaxial cable. In addition to describing microwave transmission, Mr. Melton discussed the new transcontinental television and telephone relay system.

James E. Dornoff, vice president of Pate Oil Co., Milwaukee, followed with a talk entitled "The Magic of Enthusiasm." His thoughts were of interest to the many executives and department heads present at the meeting whose work involves directing people.—*John E. Hubel*

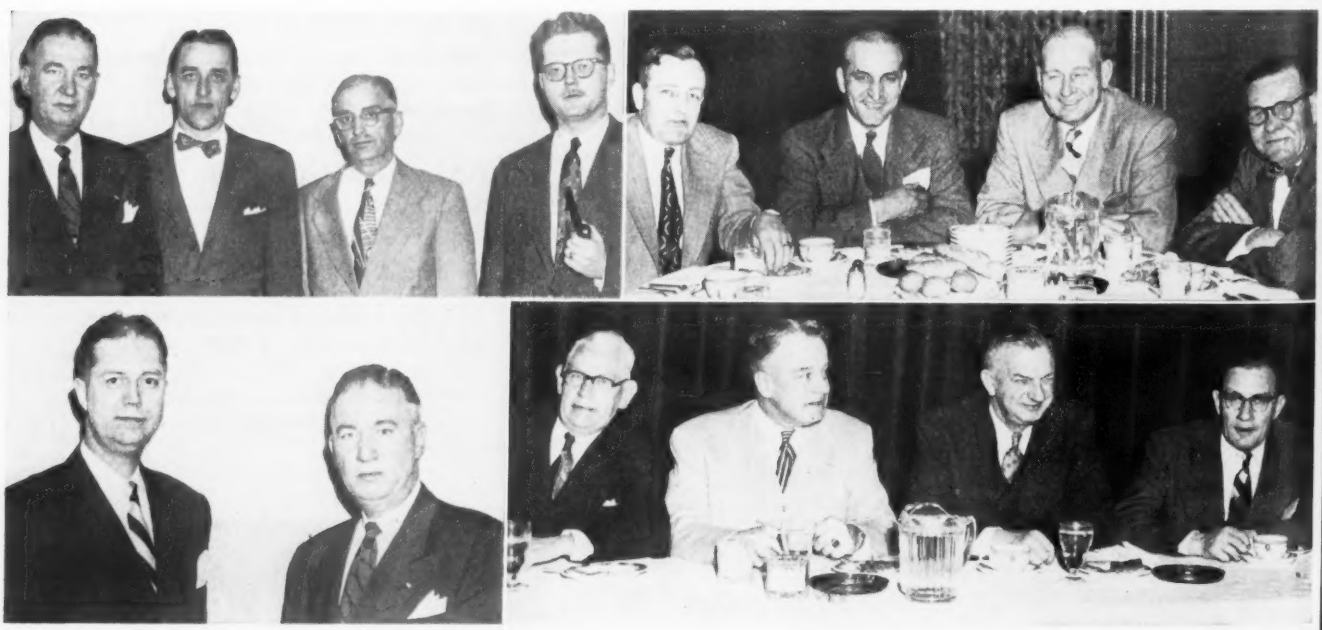
Chicago

A double-barreled program was provided for members of the Chicago Chapter, ASF, at their regular meeting at the Chicago Bar Association, Feb. 4. Two topnotch and personable speakers featured the program attended by close to 180 members and guests.

William T. Bean Jr., research consultant, Detroit, was the principal speaker on "Good Casting Design—On Purpose," and Ralph L. Lee, public relations department, General Motors Corp., Detroit, spoke philosophically on "People As They Come and Are." Each is a colorful speaker and their efforts combined to produce the most sparkling general meeting the chapter has conducted this season. Discussion lasted a full hour beyond the usual 9:30 p. m. closing time.

Chapter President Walter W. Moore presided at the business portion of the

(*Continued on page* 188)



WISCONSIN Chapter of the AFS met at Hotel Schroeder, Milwaukee, Jan. 11. Above left, left to right, are: G. E. Tisdale, Zenith Foundry Co., chapter president; D. W. Melton, Wisconsin Telephone Co., coffee speaker; Mr. Austin, his assistant, and R. V. Osborne, Lakeside Malleable Castings Co., program chairman. Above right, is a table group. At lower left are: James E. Dornoff, Pate Oil Co., Milwaukee, principal speaker, and Mr. Tisdale. Lower right, left to right, are: R. C. Woodward, Bucyrus-Erie Co.; J. G. Risney, Risney Foundry Equipment Co.; H. E. Ladwig, Allis-Chalmers Mfg. Co., and Walter Gerlinger, Walter Gerlinger Inc. Photos courtesy of Walter V. Napp, Delta Oil Products Co.

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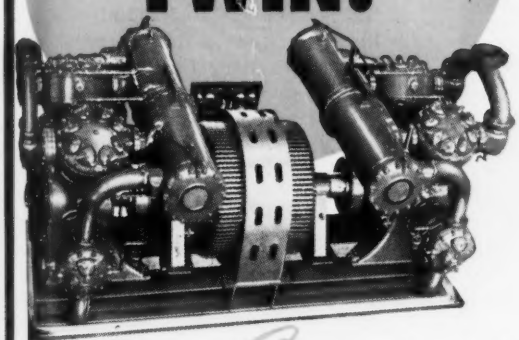

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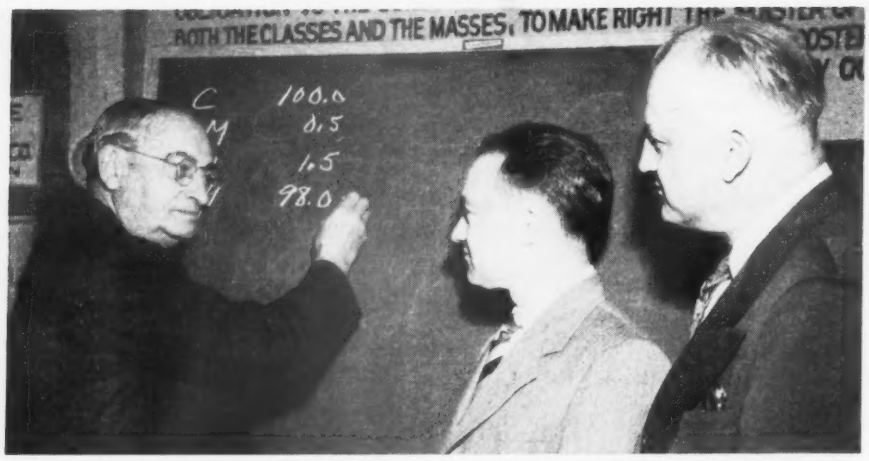

CENTRAL ILLINOIS Chapter of the AFS heard Harry M. St. John, Crane Co., Chicago, discuss brass foundry operations Jan. 7 at the American Legion Home, Peoria, Ill. Above, Mr. St. John (left) explains a point to G. F. Lloyd, Brass Foundry Co., technical chairman, and H. F. Cakora, Tazewell Machine Works. Photo by courtesy of Fred Brosmer, Caterpillar Tractor Co.

(*Continued from page* 186)

meeting. He announced that conforming to results of questionnaire poll taken recently, directors had decided the chapter would not sponsor a regional foundry conference in Chicago next fall, it being concluded that interests of the chapter are served adequately by other conferences in the Middle West. Mr. Moore called attention to the "Melting School" which the chapter's educational committee has arranged for March, and urged wide enrollment in it.

John H. Owen, chapter vice president and chairman of the program committee, conducted the technical meeting and introduced the speakers.

Mr. Lee, speaking on humanics, emphasized that people in the foundry are just as important to management as are equipment and materials and are deserving of just as much analysis and understanding. In a humorous yet serious way, he described types of workers and how their peculiarities must be recognized and dealt with.

In his presentation, Mr. Bean discussed and strongly emphasized the necessity of knowing the loads to which castings are to be subjected in use. Then, and only then, can good castings be produced, because design can be correlated properly with materials, the properties of which are known. He advocates thorough research, using strain gages to determine the loads which occur at various points in a given casting. Then it must be ascertained if the metal at those points is capable of providing the required strengths. Test bars, he states, are not an accurate measure of the properties of metal at all points in the casting.

Next meeting of the chapter, Mar. 3, will feature roundtable sessions. —*Erle F. Ross*

Central Illinois

AT the Jan. 7 meeting of the Central Illinois Chapter of AFS, Harry M. St. John, superintendent of the brass foundry and forge shop of Crane Co., Chicago, was the featured speaker. The meeting was held at the American Legion Home, Peoria, Ill., and was attended by 70 members. G. F. Lloyd, Brass Foundry Co., Peoria, served as technical chairman.

Mr. St. John's subject was "Metal Losses and Metal Balance in the Brass Foundry." He explained how, with proper controls in the melting and molding departments, metal loss can be greatly decreased for each pound of good castings sold. One of the best controls of foundry scrap, in his opinion, is a daily scrap sheet giving the foundry foreman statistics on the scrap history of each job reordered from the foundry. — *G. F. Lloyd, Brass Foundry Co.*

WESTERN NEW YORK Chapter of the AFS met at the Sheraton Hotel, Buffalo, Jan. 26, for its annual ladies' night banquet. At top, left to right, are: Walter L. Seelbach, national AFS president; Mrs. Seelbach; Mrs. Martin J. O'Brien Jr.; George G. Sipprell, Buffalo Municipal Research Bureau, speaker; Mrs. Erwin W. Deutschlander; Martin J. O'Brien Jr., national AFS director, and Erwin W. Deutschlander, chapter chairman. Bottom, view of part of the group. Photos courtesy Marve Taublieb, Frederic B. Stevens Inc.

Western New York

AT the Jan. 26 meeting of the Western New York Chapter of AFS, George G. Sipprell, managing director of the Buffalo Municipal Research Bureau, was the principal speaker. Special guests present at the meeting, which had been designated Ladies' Night, were Mr. and Mrs. Walter L. Seelbach and Mr. and Mrs. Martin J. O'Brien. Mr. Seelbach is national president of the society and Mr. O'Brien is a national director.

Mr. Sipprell, whose talk concerned itself with political corruption, made the following three proposals: Enact what might be called a little

(*Continued on page* 190)

HOW THIS FOUNDRY GOT SIX PERCENT MORE OUTPUT WITH CLECO BENCH RAMMERS

A large western foundry has six mechanized lines making small castings. They were using hand rammers on all the lines but they decided to make a comparison using Cleco "OB" Bench Rammers. Here's what they found:

1. Cleco Rammers cut ramming time about 35 percent.

2. Production of lines using Cleco Rammers was about *six percent above* the lines where hand rammers were used.

3. Uniformity of castings was improved. There was less swelling, fewer rejects and less clean-up time.

4. Operator fatigue was reduced.

This is just one example of how Cleco Rammers can increase production and reduce costs. Have a Cleco Field Engineer go over your ramming problems with you. Maybe you can increase your output, too.

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NORTHEASTERN OHIO Chapter of the AFS met Jan. 10 at Tudor Arms Hotel, Cleveland, to hear Upton Close, lecturer on world affairs, speak on "The Power Lovers." Mr. Close is shown at top right. At bottom center is Walter L. Seelbach, national AFS president, who spoke briefly on the forthcoming AFS International Foundry Congress and Show at Atlantic City, N. J., May 1-7. Photos by courtesy of Thomas W. Gallagher, Lake City Malleable Co.

(*Continued from page* 188)

"Hatch Act" which would forbid any political committeeman, whether state or local, from holding public office or even civil service jobs; change primary election procedure so that it would be illegal for executive committees of political parties to endorse and aid favorite candidates; write into the charter rigid qualifications for all so-called political appointive jobs, thus assuring that even if the appointee does belong to the party in power, at least he is qualified for the job.—*Marve Taublieb, Frederic B. Stevens Inc.*

Northeastern Ohio

UPTON Close, radio commentator and lecturer, addressed 202 members and guests of Northeastern Ohio Chapter of the AFS, Jan. 10, at Tudor Arms Hotel, Cleveland. Titling his talk "The Power Lovers," Mr. Close outlined the development of socialism since its inception in Germany in 1776. He discussed inroads it has made in this country and pointed to its influence in recent trends of governmental thinking and acting.

According to Mr. Close, the United States has departed from nationalistic concepts and has become strictly internationalistic, involved in world federation, and save-the-world plans. This policy, he says, has been fostered by those whose thinking is socialistic.

In concluding, Mr. Close touched upon present corruption in government. He remarked that we have synthetic prosperity because of production for destruction, oiled by corruption. He cited government statistics to illustrate the synthetic prosperity we have: Income of the average American worker in 1941 was $1800. Today it is $3000. What the average American does not seem to realize, however, is that today's $3000 represents 6 per cent lower purchasing power than the $1800 in 1941, according to the government's cost of living index.—*Robert H. Herrmann*

SOUTHERN CALIFORNIA Chapter of the AFS held international night Jan. 11 at Rodger Young Auditorium, Los Angeles. Left to right, are: A. M. Ondreyco, Vulcan Foundry Co., national AFS director; Harold G. Pagenkopp, Angeles Pattern Works, technical chairman, and William Romanoff, H. Kramer & Co., Chicago, principal speaker. Photos courtesy of Ken Sheckler, Calmo Engineering Co.

Eastern Canada

FEATURED at the Jan. 11 meeting of Eastern Canada Chapter of the AFS was the film, "The ADM of Cores," produced by Archer-Daniels-Midland Co. Jack King, the company's Canadian representative, presented the color-sound film which illustrated intensive research into sand and binder characteristics and the application of this research to everyday use in the core shop.

In introducing the film, Mr. King commented on the controversial subject of the sequence of additions of water, cereal and core oils to the batch and illustrated his theories by quoting the differences found in green and dry strength of core mixes resulting from varying the sequence of additions.—*A. E. Cartwright, Crane Ltd.*

Southern California

INTERNATIONAL night was held by the Southern California Chapter of AFS, Jan. 11, at Rodger Young Auditorium, Los Angeles. Special guest was A. M. Ondreyco, Vulcan Foundry Co., Oakland, Calif., a national director of the society, who spoke briefly concerning national meetings and invited all foundrymen to attend the International Foundry Congress and Show to be held in Atlantic City, N. J., in May.

Featured speaker for the meeting was William Romanoff, vice president, H. Kramer & Co., Chicago, whose topic was "Brass and Bronze Foundry Practice." The speaker stated the ultimate test of an alloy is whether or not it will give a good casting, and to determine this, an analysis of existing losses and their causes must be made. Items to be considered, in order of importance, are: Gating, pouring temperature, melting practice, sand, pattern equipment and metal.

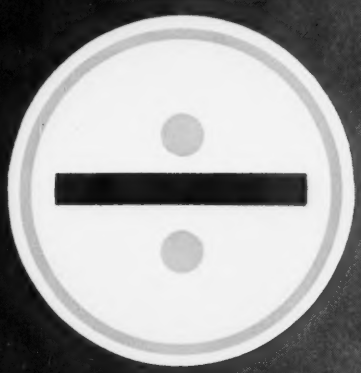
Mr. Romanoff then described the various steps followed to produce ingots from scrap metal. These are: Sorting for quality and removal of impurities; melting; refining by oxidation from three to 13 hours; and pouring into ingot molds. Rough top and smooth top ingots are comparable, in the opinion of the speaker, although there is less chance of impurities in molten metal with the smooth top ingot, since less foreign matter usually collects on it.

It was then pointed out that down-

(*Continued on page* 192)

OREFRACTION

ZIRCON SAND AND FLOUR



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NATIONAL FOUNDRY SAND COMPANY, Detroit

(*Continued from page* 190)
grading of ingots does not mean a cheapening but rather a cutting down on the proportion of elements making up a particular ingot. He emphasized the need for atmosphere control during melting. In red and yellow brasses, it is mandatory to use an oxidizing atmosphere. This can be determined by observing the flame over the metal, use of an Orset apparatus, or by placing a piece of zinc over the flame. If the zinc turns yellow, an oxidizing atmosphere is present; if it turns sooty, the atmosphere is reducing and should be adjusted.

The best test for casting quality is the fracture test, although chemical analysis and the stress test also are used. Mr. Romanoff recommended keeping records on production details of each job to save time on future runs of the same casting. This will simplify the loss analysis.

Where high shrinkage, drossy alloys are used, it is best to pour a test plug in sand. If the metal rises, the melting atmosphere was incorrect and phosphor-copper should be added to increase fluidity.

In conclusion, Mr. Romanoff reviewed various metals used in the present defense effort. Manganese bronze, composed of copper, manganese, zinc and iron, seldom produces gas because zinc vapor is not present. This is a strong alloy and is used to compete with mild steel and forgings. No heat treatment is necessary. Silicon bronze, composed of copper, silicon, manganese and iron, is corrosion resistant and widely used for valve stems in place of Monel. Aluminum bronze is good in the high-strength fields. However, it is difficult to cast since it is susceptible to high fatigue and rapid cooling. Nickel silver is an excellent corrosion-resistant alloy and makes a good base for chrome.—*Alfred A. Grant III, Grant & Co.*

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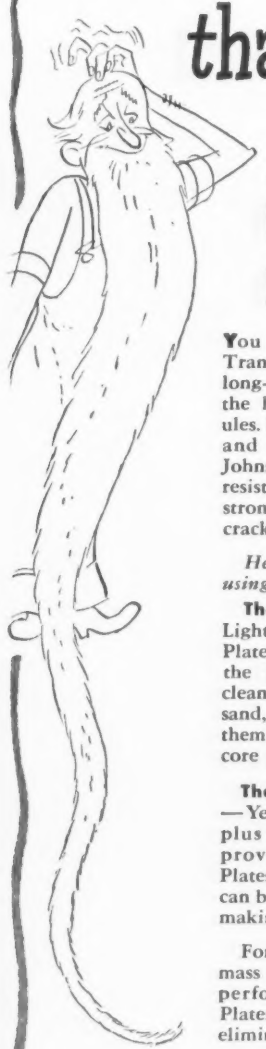

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Made of Asbestos

Toledo

CONTROL of dust and fumes in the foundry was discussed by Dr. Gordon C. Harrold, consultant in the field of industrial hygiene, at the January meeting of the Toledo Chapter of AFS.

In duscussing dust control, Dr. Harrold stated that only dust containing 10 per cent or more free silica promotes silicosis and that normally only particles less than .0025-in. in diameter enter the lungs. Such small particles may be produced on the floor by walking, in blasting and tumbling operations, and in the chipping and grinding of castings having adhering sand. The air hose, used to blow dust from castings and work areas, was cited as being the worst offender in the foundry. Sand should be dampened for handling whenever possible and vacuum equipment used to remove dust from floors.

(*Continued on page* 195)

TOLEDO Chapter of the AFS heard Gordon C. Harrold, consultant, discuss dust and fume control at its January meeting in the Toledo Yacht Club. Mr. Harrold is at left. At right is Walter Drager, Bunting Brass & Bronze Co., technical chairman

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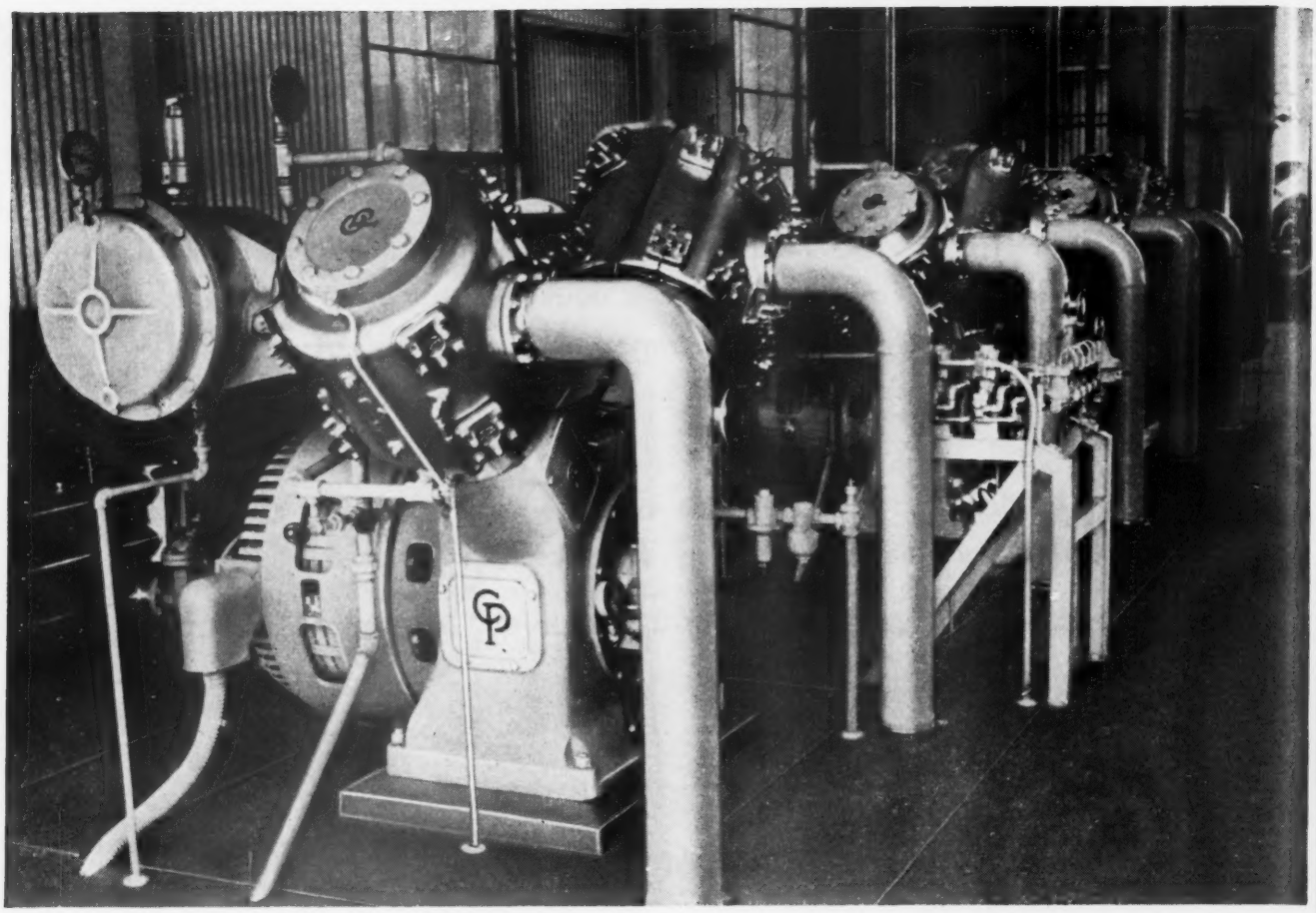
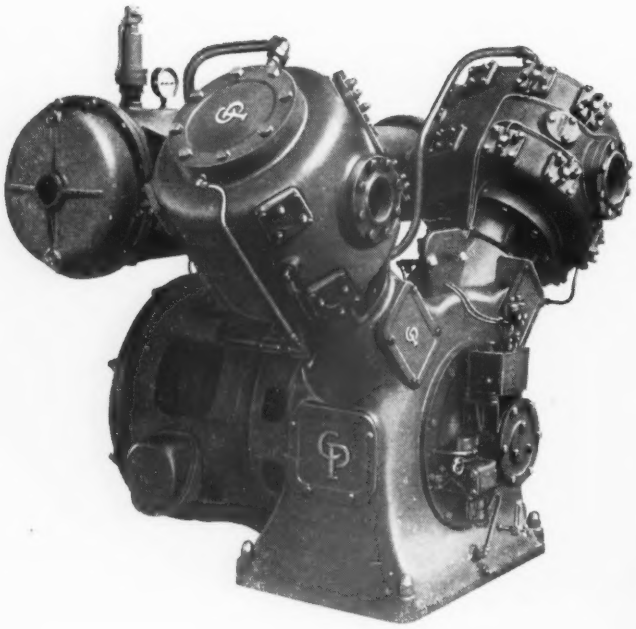


FOR HEAVY DUTY



COMPACT, EASILY INSTALLED TYPE Y COMPRESSOR

Where floor space is limited, and continuous, heavy duty service is required, the Type Y Compressor is ideal. Available with direct-connected, flange-mounted synchronous or squirrel cage motor.

The Type Y Compressor is easy and inexpensive to install, requiring only a simple foundation. No aligning or leveling is necessary.

CP features that assure high efficiency and low maintenance include large area Simplate valves, multi-step capacity regulation, effective inter-cooling, precision bearings and force-feed lubrication.

Built in sizes from 75 h.p. to 250 h.p., 501 c.f.m. to 1663 c.f.m.; available also with belted and coupled motors.

Write for Bulletin 766

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PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

(*Continued from page* 192)

Where periodic x-rays are used as a control for silicosis, only physicians having experience in that field should be selected since interpretation of x-rays requires considerable skill.

Injurious fumes in ferrous foundries are rare, although the low hydrogen welding rods employing fluorides in the flux may be injurious where the fluoride content is 10 to 15 per cent or greater. In nonferrous foundries, lead is the worst offender. Most foundries provide adequate exhaust systems around melting units, although few pay attention to the dross, which is equally dangerous. Use of power tools to grind lead or lead bearing alloys used in patternmaking is dangerous; hand files and cutters are safe.—*Gerald J. Grott, Unitcast Corp.*

Philadelphia

REAR Admiral Homer N. Wallin, chief of the Bureau of Ships, will address members and guests of Philadelphia Chapter of the AFS on the subject, "The Foundrymen's Support of the Rearmament Program," Mar. 13 at Franklin Institute, Philadelphia. The night is the occasion of the chapter's annual management dinner.

ADM. H. N. WALLIN

Admiral Wallin is a native of Washburn, N. Dak., and was appointed to the United States Naval Academy in 1913. Included in his service with the U. S. Navy are tours of duty at the New York Navy Yard, Mare Island Navy Yard, Philadelphia Naval Shipyard, and Norfolk Yard. He was assigned to his present post on Feb. 1.

Speaker at the Jan. 11 meeting of the chapter was one of its members, William Morley, Olney Foundry Co., division of Link-Belt Co., Philadelphia. Mr. Morley presented his paper, "Is the Mechanization of your Foundry Practical?" which he prepared as the exchange paper for presentation at the 1951 International Foundry Congress held in Brussels, Belgium.

Mr. Morley pointed out that each shop has its own mechanization problems based on the type of metal poured and whether it is a production or jobbing shop. Before mechanizing even a portion of the plant, Mr. Morley recommended that a drawing of present facilities be made and carefully studied by all departments. Then a new layout should be designed to establish a flow pattern from raw materials to finished castings.

The speaker estimated that 125 to 200 tons of material are handled to produce one ton of castings, 80 per cent of which is concentrated in the molding department; so that department probably would benefit most from mechanization.

Vice Chairman Arnold Kraft, Wilkening Mfg. Co., then introduced Michael Baccellieri, Baccellieri Mfg. Co., who served as technical chairman and conducted the question and answer period.—*Arthur A. Thum, Palmyra Foundry Co.*

No. Illinois and So. Wisconsin

FEATURED speaker at the Jan. 8 meeting of the Northern Illinois-Southern Wisconsin Chapter of AFS, held at Faust Hotel, Rockford, Ill., was C. V. Nass, vice president of Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago. He first discussed briefly the coming AFS In-

(*Continued on page* 199)

ONE CUPOLA LINING LASTS
THREE TIMES AS LONG-IT'S BUCKEYE!
Buckeye Silica Firestone's high resistance to heat and abrasion results in much longer life for linings and patches in the melting zone of cupolas.
In many leading foundries, Buckeye has proved its superior ability to withstand severe conditions of long, continuous heats.
Because it is the best you can buy, Buckeye deserves your consideration. May we tell you more about its economy and efficiency?
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BUCKEYE SILICA FIRESTONE
• Full explanation of Buckeye is found in Bulletin 15-B

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"FOR THAT EXTRA SERVICE"
SILICA FIRESTONE

NORTON PORTABLE GRINDING

cut your rough grinding costs because they . . .

Hug That Work!

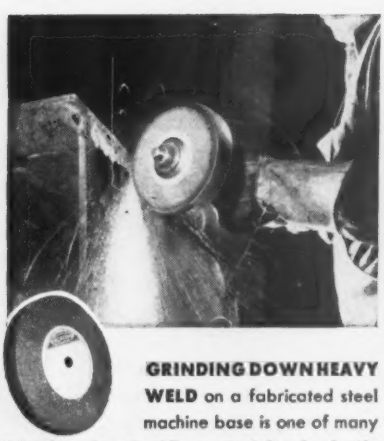
YOU FEEL THE DIFFERENCE when you put Norton portable grinding wheels to work. *They hug that work.* Less bounce . . . less vibration. Their more-continuous contact with the work pays off three ways. It means faster grinding, longer wheel life and less operator fatigue. You *see* this difference when you add up your costs.

This cost-cutting, work-hugging feature of Norton portable grinding wheels comes from *controlled uniformity* and *built-in balance* . . . recently obtained by Norton production engineers to a degree never before achieved. It's the revolutionary new Norton manufacturing process that helps you cut your grinding costs.

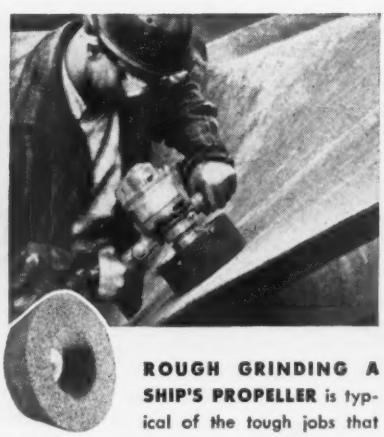
Ask your nearby Norton distributor about the new, improved Norton portable grinding wheels. He's listed under "Grinding Wheels" in your classified telephone directory. Or write direct to Norton Company, Worcester 6, Mass. Distributors in all principal cities.

EXPORT: Norton Behr-Manning Overseas Inc., Worcester, Mass., New Rochelle, N.Y.

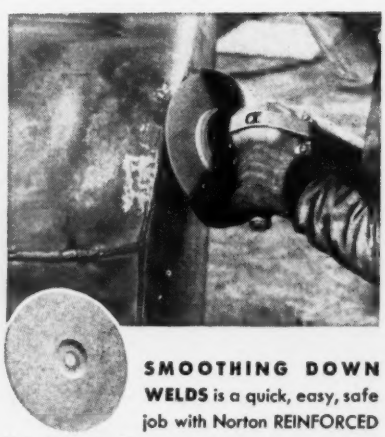
Work-Hugging Norton Portable Grinding Wheels are cutting costs on jobs like these:



GRINDING DOWN HEAVY WELD on a fabricated steel machine base is one of many jobs done best by Norton straight wheels. No other wheels *hug that work* so closely . . . remove so much metal per man-hour . . . last so long.



ROUGH GRINDING A SHIP'S PROPELLER is typical of the tough jobs that Norton cup wheels make easy. Fast-cutting and long-lasting, they do an extremely efficient job with a minimum of operator fatigue.



SMOOTHING DOWN WELDS is a quick, easy, safe job with Norton REINFORCED Hub Wheels. The two types — the rigid BD and the more flexible BFR — make it possible to handle any weld grinding job correctly.

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Against Heat, Sparks, Hot Metal Splashes

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AO 7X161CL SPAT

Safeguards instep and ankle. Spring clip on instep to hold flare. Three positions at top of spat and two at ankle for steel stay, assuring snug fit and immediate release.

AO 7X160CL LEGGING

Protects lower leg, ankle and instep. Popular because of its unusual design and features. Spring clip on instep holds flare in position. Has three positions at top of legging and two positions at ankle for steel stay, permitting snug fit and immediate release.

Both the Legging and Spat are also available in asbestos or flame-resisting duck, under different model numbers. Your nearest AO Safety Products Representative can supply you.

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American Optical COMPANY

SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

(*Continued from page 195*)

ternational Foundry Congress and Show to be held in Atlantic City, N. J., in May and then presented a motion picture entitled "Mechanization in Molding," produced by Beardsley & Piper.—*J. S. Zabel, Zabel Foundry Sales Inc.*

Twin City

A PARTICULARLY successful meeting of the Twin City Chapter, AFS, was held Jan. 8, with over 100 members and guests present to hear an excellent talk on "Core Blowing in a Semi-Production Foundry" by Mr. L. J. Voros, general coreroom foreman, Caterpillar Tractor Company, East Peoria, Ill.

Mr. Voros first outlined the following basic ingredients that are necessary to make core blowing successful: 1. Co-operation among departments where casting design, pattern, and core departments work together to solve a core blowing problem. 2. Imagination and ingenuity in rigging coreboxes. 3. Accurate control of core sand mixtures—particularly moisture content.

Core sand moisture is very critical, the speaker reported. Moisture must be greater than 1.8 per cent or the mixture will have an abrasive action on the core box, plug vents, and the green cores will have soft spots. Too much moisture in a core mixture (greater than 2.5 per cent) will render it difficult to blow and the cores will have insufficient green strength. Moisture for small cores should be 1.8-2.0 per cent, for large cores 2.0-2.5 per cent.

Following the talk, the group split in two sections. One section led by Nate Levinsohn, superintendent of Minneapolis-Moline Lake Street Foundry, asked questions of the speaker relative to cores and core blowing. The other section discussed "Casting Design and Heat Treatment of Iron Castings," led by Herman Rischall, American Hoist & Derrick Co.—*J. D. Johnson, Archer-Daniels-Midland Co.*

Saginaw Valley

TO start the new year, Saginaw Valley Chapter of the AFS met Jan. 3 at Fischer's Hotel, Frankenmuth, Mich. The meeting comprised three roundtable discussions covering iron, light metals and steel. Prior to the technical discussions, a sound movie was shown through courtesy of the Aviation Gas Turbine Division, Westinghouse Electric Corp., dealing with the production of aircraft jet engines.

Speaker and discussion leader of the gray iron group was H. H. Wilder, manager of the Iron Foundry Division, Vanadium Corp. W. H. Holden Eaton Mfg. Co., Foundry Division, was technical chairman. Topic discussed was "Metal Controls for Iron." Mr. Wilder pointed out that good control in foundry practice would increase the application of all types of ferrous castings. This control begins with casting design. To continue this control, foundries should record operating trends, maintain good laboratory practice and understand thoroughly the service requirements of the finished casting. Setting of purchasing specifications in each foundry is also good practice.

"Steel Castings as We Want Them," was the topic of A. H. Schloz, E. W. Bliss Co., Toledo, O. L. A. Cline, Saginaw Foundries Inc., was technical chairman. Mr. Schloz described the uses of steel castings, weldments and Meehanite castings produced in the Bliss company foundries. He stated use of weldments is increasing at the expense of iron castings because of the relatively high cost of pattern equipment for single machines and the weight savings possible. Meehan-

TWIN CITY: Shown at the Jan. 8 chapter meeting of Twin City Chapter are, left to right: John Roth, Progress Pattern & Foundry Co., St. Paul; L. J. Voros, Caterpillar Tractor Co., Peoria, Ill.; Francis Hromadko and W. Williamson, Minneapolis-Moline Power Implement Co., Minneapolis; O. Jay Myers, Archer-Daniels-Midland Co. Photo by Lou Lund, Archer-Daniels-Midland Co., Minneapolis

PHILADELPHIA Chapter of the AFS met Jan. 11 at the Engineers Club, Philadelphia. Above, front, is William Morley, Olney Foundry Co. Division, Link-Belt Co., Philadelphia, who spoke on the practicality of foundry mechanization. At the microphone is Fred Sefing, International Nickel Co., New York, national AFS director, who talked about the International AFS Convention to be held in Atlantic City in May, and Arnold N. Kraft, Wilkening Mfg. Co., Philadelphia, chapter vice chairman. Photo by courtesy of Leo Houser

ite castings are replacing steel castings to a small degree. However, there will always be a place for steel castings in their products. He stated that if steel castings had better surface appearance, they would be used more extensively to obtain lighter sections and less weight in their machines.

Speaker at the light metals session was P. G. DeHuff, Aviation Gas Turbine Division, Westinghouse Electric Corp., and Dr. John C. McDonald, Dow Chemical Co., was technical chairman. Mr. DeHuff complimented the foundry industry for the uniformly good quality, dimensional accuracy and surface finish of the light alloy castings received, especially in view of the increasing complexity of the castings. The major problem is the inability of foundries to provide the quantity of castings required for the accelerating military program.

He stated that foundrymen are partially responsible for the increasing complexity of aircraft castings because they are failing to advise the engineer of the foundry problems that will arise from proposed design changes and not suggesting alternates that would make the design more practical.—*Roy Dahmer, Eaton Mfg. Co.*

BETTER CASTINGS!
For good, sound castings free from pinholes, and shrinkage cracks, keep close control of your molten metal temperatures! Check the temperature of every melt frequently with Marshall Enclosed-Tip Thermocouples.
Use of Marshall Thermocouples will enable you to pour all melts at definite, correct temperature. Underheating and overheating of metals, and misruns and cold shuts, are prevented. Castings also have better finish, require less cleaning.
Use Marshall thermocouples for checking all your nonferrous molten metals — brass, copper, aluminum and magnesium. L. H. Marshall Co., 270 W. Lane Ave., Columbus, Ohio.
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THERMOCOUPLES

Detroit

SUSTAINING Members Night and the appearance of Chester V. Nass as the evening's speaker combined to make the Jan. 17 meeting of the Detroit Chapter of AFS the best attended of the current season.

Chapter Chairman Vaughan C. Reid introduced the following representatives of sustaining member companies: Harold McMurray, Ford Motor Co.; G. L. Galmish, Michigan Malleable Iron Co.; Walter Kantzler, Kelsey-Hayes Wheel Co.; L. Carl Beers, Claude B. Schneible Co.; and George C. Collingwood, Pontiac Motor Division, General Motors Corp.

Chester V. Nass shows bookends received from Detroit Chapter

Chairmanship of the chapter's membership committee has passed to E. W. Gerhard Jr., Swedish Crucible Steel Co., succeeding Crary Davis, Aluminum Co. of America.

Mr. Nass, president of the Foundry Equipment Manufacturers Association and vice president of Pettibone Mulliken Corp. and general manager of its Beardsley & Piper Division, brought before the group the movie "Mechanization in Molding." This educational film is undergoing revision and its new sections were also shown.

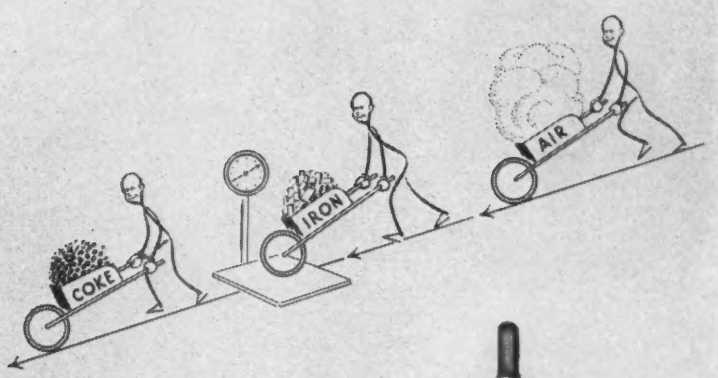
In recognition of Mr. Nass' outstanding work in behalf of the foundry industry, the chapter presented him with a pair of bookends bearing the AFS symbol.—*Howard C. Tuttle*

Chesapeake

ANNUAL oyster roast of the Chesapeake Chapter of AFS, held Jan. 12 at the Alcazar, Baltimore, was enjoyed by more than 350 found-

(*Continued on page* 202)

Foundry costs come down

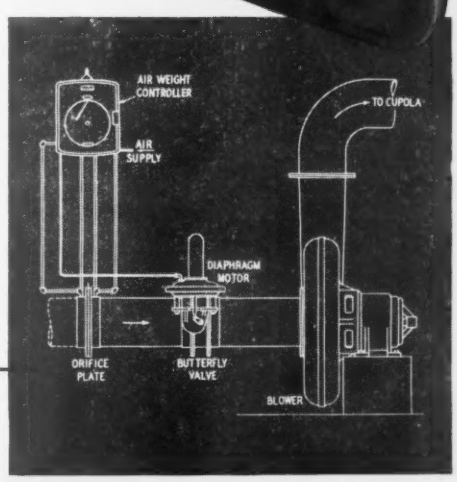


. . . when you weigh air too

Leading foundries report lower fuel costs, fewer rejects, and less pigging after installing Foxboro Air Weight Control. That's because the cupola blast is fully compensated for every change in atmospheric pressure and temperature. *The right amount of oxygen for the quantity of coke charge* insures better combustion, more uniform heats and better quality castings.

Foxboro Air-Weight Controllers automatically control cupola blast by *weight of air* instead of volume. They are one of Foxboro's many original developments in instrumentation to cut industrial costs. Representative installations will be found throughout the foundry industry. The names of those located nearest you will be gladly sent on request.

Now, . . . you can make the most of modern foundry practice by installing the advanced-design Model 40 Air-Weight Controller by Foxboro. Installation is easy and fast. Results will far outweigh the investment. Write for complete details. **The Foxboro Company, 323 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities.



Typical installation set-up of Foxboro Air-Weight Control . . . readily adaptable to either a centrifugal blower (shown in diagram) or a positive displacement blower.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

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FOR YOUR OLDER
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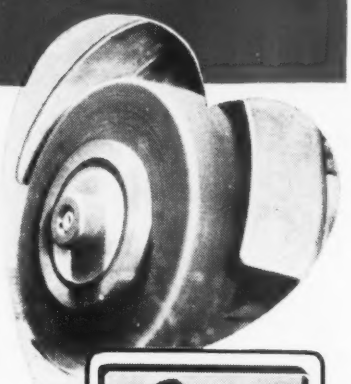

If you are a victim of the machine tool situation, you'll find that Electro *Specific Purpose* Grinding Wheels in your older machines, will largely offset obsolescence.

The heart of any grinding machine is the wheel; and super-efficient wheels can help you get by until the machine tool situation eases.

The technicians in our chemical and engineering laboratories will, if necessary, originate special wheels to meet your requirements.

They have complete latitude as to kinds of abrasives and types of bonds. We'd like to apply this total freedom in materials and methods for gains to you in quality of output, saving in time and lower costs.

May we, at our risk, send a Field Engineer to consult with you within the next few days?

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SPECIFIC PURPOSE
GRINDING
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PRECISION GRINDING
SNAGGING
MANUAL 645 AND
SPEED CALCULATOR
FREE ON REQUEST

K-413

Electro
SPECIFIC PURPOSE GRINDING
WHEELS

(*Continued from page* 200)

rymen and their friends. Seven full barrels of oysters served raw, fried stewed and frittered were consumed. In addition, the group also enjoyed some barbershop quartet music as well as that of a three-piece band. A. A. Hochrein, American Smelting & Refining Co., was in charge of arrangements—*Joseph O. Danko Jr., Arlington Bronze & Aluminum Corp.*

Lancaster-York

THERE were 55 members and guests present at the Jan. 17 meeting of the Conestoga Foundrymen's Association, held at Wiggins' Restaurant, Lancaster, Pa., to hear William Morley, Olney Foundry Division, Link-Belt Co., Philadelphia. His talk was entitled, "How To Start To Mechanize a Foundry."

Mr. Morley's thought was to present a "tool" with which any foundry thinking in terms of mechanization could examine its own situation. Each case must be studied separately to arrive at an answer that will fit the particular conditions. By using charts, Mr. Morley reviewed reasons for mechanization; people involved; present facilities and equipment cost. He stated that with the progress being made in control and equipment it must not be overlooked that a good worker and efficient management cannot be replaced by machines.—*Mark E. Mohr, Hershey Machine & Foundry Co.*

New Jersey

A TALK on "Shell Molding" by Bernard M. Ames, senior metallurgist, New York Naval Shipyard, Brooklyn, N. Y., brought out a record attendance of 160 at the Jan. 21 meeting of the New Jersey Foundrymen's Association at the Military

(*Continued on page* 204)

METROPOLITAN Chapter of the AFS met at the Essex House, Newark, N. J., Jan. 7 to hear Prof. Howard Taylor, MIT, (right) discuss gating and risering. At left is James S. Vanick, International Nickel Co., chapter president. Photo by John Bing, Metropolitan Refractories Corp.

MELTRITE PIG IRON

A FAMOUS BUY-WORD IN THE INDUSTRY

● **Making MELTRITE**
Casting the molten iron from a blast furnace.

MORE USED THAN ANY OTHER MERCHANT PIG IRON

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69 years of service to industry

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(*Continued from page* 202)

Park Hotel, Newark, N. J.

Principal advantages of the process are substantial savings in machining and cleaning due to the unusually smooth surface obtained and small tolerances practicable in the as-cast condition. It is also possible to obtain sounder castings with less need of chills than ordinary sand castings because of the high permeability of thin shell molds.

However, use of the process is limited to designs that lend themselves to suitable parting, gating and heading arrangements; and reasonable volume is necesary since tooling costs are high. The process can be used for most types of ferrous and nonferrous metal, but has worked out particularly well for gray, nodular and malleable iron.

Alloy cast iron is generally used for the pattern equipment. Special equipment is needed for investing the patterns and for heating and curing the molds. For large production jobs, it may pay to have expensive elaborate equipment to cut production costs, but for shorter runs or experimental work, simple equipment costing as little as $300 can be used.

Range of economical application of the process is limited somewhat by the high cost of phenolic resins which amount to 40 to 60 per cent of the total cost of material and direct labor. It is hoped, however, that improvements in the process for producing the resins may in the future make it possible to produce them at lower cost.

To conclude the discussion, additional points of interest about the process were brought out by Richard Herold, manager, foundry products department, Borden Co.; and R. D. Noyes, sales engineer, Bakelite Co.—*John L. Carter*

AJAX-WYATT
ELECTRIC
FURNACE

This line frequency induction furnace, so universally used in the wrought brass industry, is now, because of improved linings, available for melting ferrous alloys used in the foundry industry.

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Associate Companies:
AJAX *Electro Metallurgical Corporation*
AJAX *Electrothermic Corp.*
AJAX *Electric Co., Inc.*
AJAX *Engineering Corp.*

New England

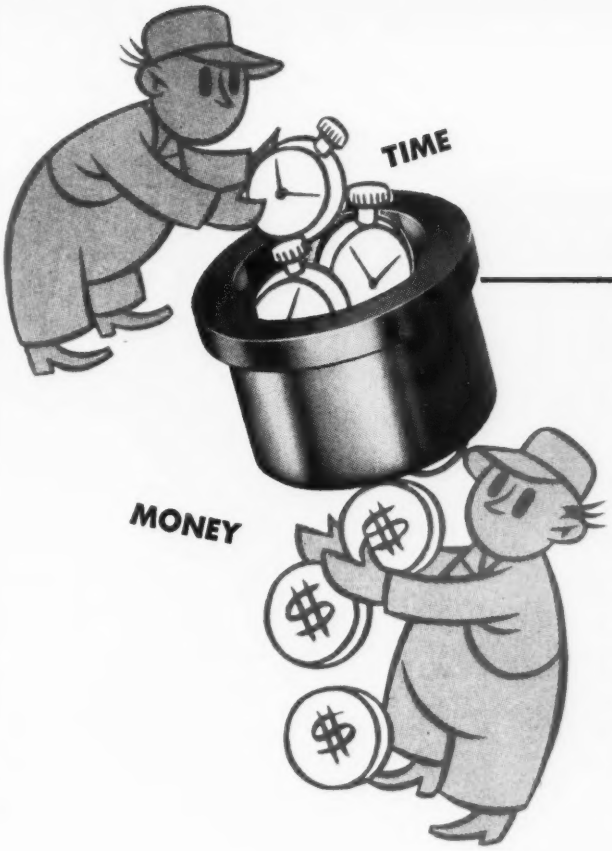
A CAPACITY turn-out attended the 56th annual meeting of the New England Foundrymen's Association held Jan. 9 at the Parker House Roof, Boston. Following a congenial social hour and dinner, the following were elected officers and members of the executive committee:

President, Frank R. Elliot, Westinghouse Electric Corp., Springfield, Mass.; vice president, Joseph B. Stazinski, General Electric Co., Lynn, Mass.; secretary-treasurer, Thomas I. Curtin, Waltham Foundry Co., Waltham, Mass. Executive committee: Joseph B. Stazinski, chairman; Gordon L. Paul, Brown & Sharpe Mfg. Co., Providence, R. I.; Henry G. Stenberg, Draper Corp., Hopedale, Mass.; Harry E. Gibby Jr., Mechanics Iron Foundry Co., Boston, Mass.; Albert M. Nutter, LeBaron Foundry Co., Brockton, Mass.; John A. Curtin, Waltham Foundry Co., Waltham, Mass.; Howard B. Nye, Crompton-Knowles Loom Works, Worcester, Mass.; and Charles A. Reed, Cambridge, Mass.

A fine entertainment program fol-

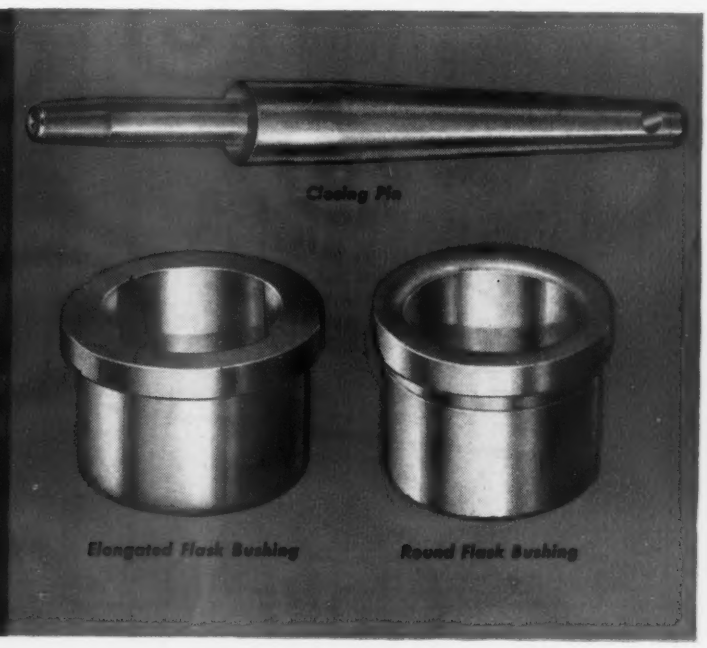
(*Concluded on page* 208)

CENTRAL MICHIGAN Chapter of the AFS met Jan. 16 at Hart Hotel, Battle Creek, Mich., to hear a talk on ductile iron. Left to right, are: Frank B. Rote, Albion Malleable Iron Co., technical chairman; Richard A. Flinn, professor of Metallurgy, University of Michigan, speaker, and Thomas I. Lloyd, Albion Malleable Iron Co., chapter chairman



UNIVERSAL flask pins and bushings can convert wasted time into money in your foundry

Universal Flask Pins and Bushings save precious minutes by assuring instant, accurate alignment of cope and drag. Since they are heat-treated and precision ground from high quality steel to stand up under rough treatment, Universal Flask Pins and Bushings also save the cost and down-time that replacement always requires. Cope Bushings are quickly guided to Drag Pins over tapered, loose-fitting Closing Pins which are easily removed after assembly. The special elongated Flask Bushing is designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Standard sizes are carried in stock — special sizes and types to order. Direct your inquiries and orders to the office nearest you — 1060 Broad St., Newark, N. J., and 5035 Sixth Ave., Kenosha, Wisconsin — or write to our home office.



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NEW "61" SERRATED RUBBER CONTACT WHEEL for Abrasive Belts

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Adopt the new "61" the revolutionary contact wheel pioneered by CARBORUNDUM and now in use for hundreds of abrasive belt applications on backstand and swing frame grinders.

Special serrations in the "61" Wheel face are designed to cause a controlled breakdown in the bond of the abrasive belt. This action reduces belt glazing so sharply that you get as much as *double the productive life* from each belt.

Out of this reduction in glazing and increased belt life, you get other important advantages automatically: uniformly high stock removal over the entire life of the belt . . . radical decrease in rejects . . . loading substantially diminished . . . quality of finish that's consistent from first to last . . . safer on heat-sensitive work because glazing is minimized . . . less downtime . . . far less operator fatigue (the wheel itself takes over a heavy share of the work load).

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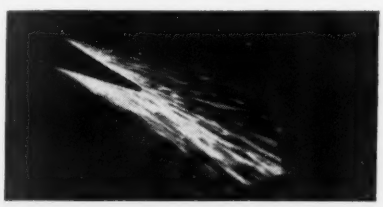
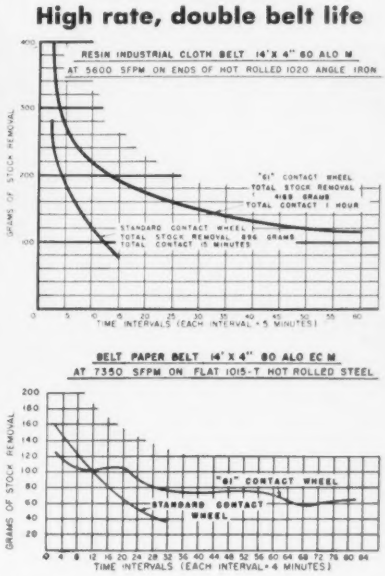


• Spark pattern at 24-minute mark using belt on standard serrated wheel.

• Spark pattern at 80-minute mark using belt on NEW "61" WHEEL.

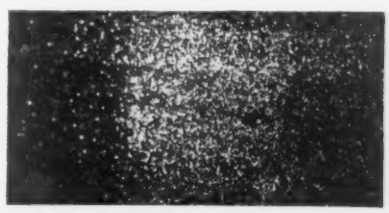
Only the contact wheel is different in these two photos—same type of belt, same work, same surface speed, same camera exposure—but what a difference in cutting action!

STOCK REMOVAL
High rate, double belt life


RESIN INDUSTRIAL CLOTH BELT 14" X 4" 80 ALO M
AT 5600 SFPM ON ENDS OF HOT ROLLED 1020 ANGLE IRON
GRAMS OF STOCK REMOVAL
"61" CONTACT WHEEL
TOTAL STOCK REMOVAL
TOTAL CONTACT 1 HOUR
STANDARD CONTACT WHEEL
TOTAL STOCK REMOVAL 896 GRAMS
TOTAL CONTACT 15 MINUTES
TIME INTERVALS (EACH INTERVAL = 5 MINUTES)
BELT PAPER BELT 14" X 4" 80 ALO EC M
AT 7350 SFPM ON FLAT 1015-T HOT ROLLED STEEL
GRAMS OF STOCK REMOVAL
"61" CONTACT WHEEL
STANDARD CONTACT WHEEL
TIME INTERVALS (EACH INTERVAL = 4 MINUTES)

The charted advantages of the "61" Wheel with both cloth and paper belts graphically demonstrate the constant cutting rate, startling when compared with the cutting rate of any other contact wheel.

NON-GLAZING THAT'S AMAZING



• Glazing on belt after 24 minutes using standard serrated wheel.

• Non-glazing on belt after 80 minutes using NEW "61" WHEEL.

Unretouched photos tell the story. Same belt—same work—different wheels. Imagine—the belt section in lower photo has already run more than *three times as long* as the section above—still has plenty of abrasive life left, still is unglazed!

THE NEW "61" WHEEL, a CARBORUNDUM engineering development, is typical of the constant technical advances you can expect from CARBORUNDUM, the abrasive pioneer. Yes, the "61" will give you increased productivity from *any* abrasive belt, but if you're not now using belts by CARBORUNDUM try one. The two go hand in hand.

RUNDUM

REG. U.S. PAT. OFF. TRADE MARK

offers ALL abrasive products...to give you the proper ONE

82-54

(*Concluded from page 204*)
lowed installation of the officers.—*Myron DeHollander, General Electric Co.*

Pittsburgh

MORE than 110 members of the Pittsburgh Foundrymen's Association and their guests enjoyed a talk by Clyde A. Sanders, vice president, American Colloid Co., Chicago, at the Jan. 21 meeting. Discussing "How Can Molding Sand or Molding Procedure Influence Metal Shrinkage?" Mr. Sanders pointed out that most foundrymen assume metal shrinkage is due largely to a metal condition rather than to the sand. "Metal shrinkage" and "apparent shrinkage" are two different defects and the latter is often misinterpreted as a "true metal shrink."

In his research work the speaker investigated the difference in "apparent metal shrinkage," when the metal condition was held constant by melting in an electric furnace, discharging into the ladle and then pouring into molds made from various sand mixtures. Different methods of molding produced different results, the same as did different sand mixtures.

The research indicated that any mold which would deform under hot load would produce an over-size and over-weight casting. Consequently, such castings will require more risers or chills to prevent "apparent metal shrinkage" from occurring. It was found that a molding sand mixture which was too plastic, heavy with water and rammed medium to soft, would be more likely to produce an "apparent metal shrink," than a dry mixture low in bond with additions of seacoal, wood flour, southern bentonite and hard rammed.

In conclusion, Mr. Sanders stated that if carbon equivalent of the gray iron mixture is high—yet shrinks appear—the next immediate question is to ask, "Is the casting over-size and over-weight?" If it is not, then the shrinkage may more likely be due to a metal or gating condition rather than a mold condition.—*Dan Reebel*

Rochester

TWO special guests at the Jan. 8 meeting of the Rochester Chapter of AFS were William W. Maloney, secretary-treasurer of the society, and Lloyd Wright, U. S. Radiator Co., Geneva, N. Y., a national director.

Principal speaker of the meeting was T. J. Stanton, Induction Heating Corp., Brooklyn, N. Y., whose talk was on "Dielectric Core Baking." This method of core baking is gradually being accepted by the foundry industry. Through slides, Mr. Stanton showed particular problems of core baking by the process. It applies high voltage and low current flow and is especially well suited to baking cores in which resin binders are used.

Installations made since 1940 indicate the cost of installation may be amortised in a short time through savings permitted. Advantages cited were: Cores are baked completely and quickly; few core driers are required because of the rapidity of the bake; and the oven is practical in both production shops and jobbing foundries.—*Herbert G. Stellwagen Hetzler Foundries Inc.*

Canton

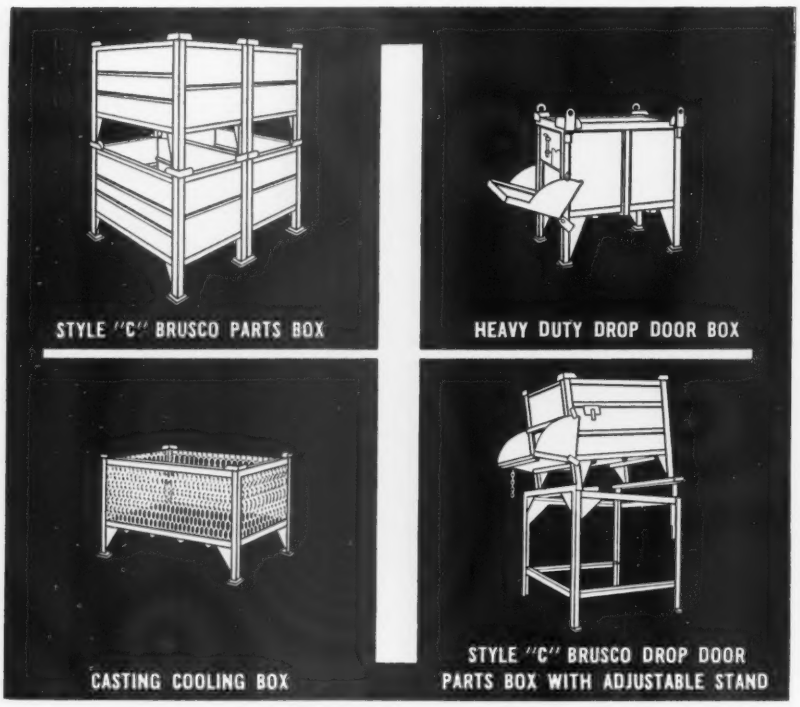
THE Canton District Chapter of AFS will hold its Mar. 6 meeting at the Elks Club, Alliance, O. Featured speaker will be Frank G. Steinebach, editor of FOUNDRY whose talk is entitled, "The Foundry in the Mobilization Program."—*William T. Cole, Canton Malleable Iron Co.*

IS YOUR PLANT

HANDLING PRODUCTION PARTS

WITH PEAK EFFICIENCY?

Let **BRUSCO** show you how to hang on to parts handling dollars that you may be losing.


STYLE "C" BRUSCO PARTS BOX
HEAVY DUTY DROP DOOR BOX
CASTING COOLING BOX
STYLE "C" BRUSCO DROP DOOR PARTS BOX WITH ADJUSTABLE STAND

1. **BRUSCO** saves all kinds of valuable space when it comes to handling and storage. Units are easily stacked or tiered to make full use of vertical space, leaving more floor space for production work and machinery.
2. **BRUSCO** is engineered to work with every method of material handling.
3. **BRUSCO** is all steel, welded for strength and rigidity and fabricated with the correct gauge to meet your handling requirements.

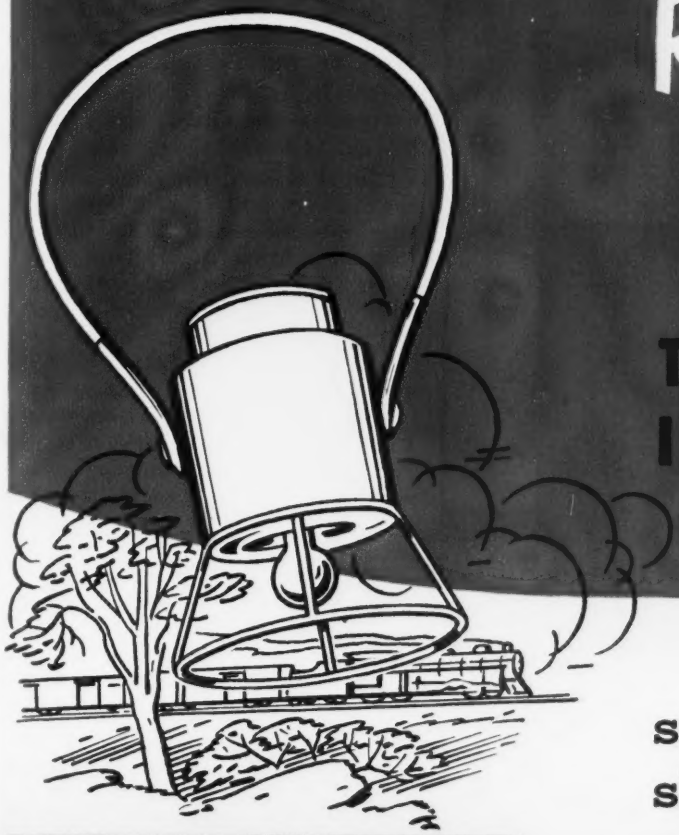
Shown above are a few standard items of the **BRUSCO** Material Handling Line. These and many other units of **BRUSCO** equipment can be built to fit your particular handling conditions. *Write for full information. If you have a handling problem, let* **BRUSCO** *beat it.*

BRUMMELER STEEL PRODUCTS CORPORATION

1412 Ionia Ave. S. W., Grand Rapids, Michigan

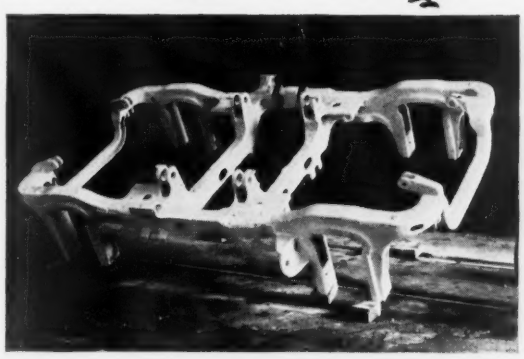
Railroads are particular!

They require SOUND, INTRICATE castings

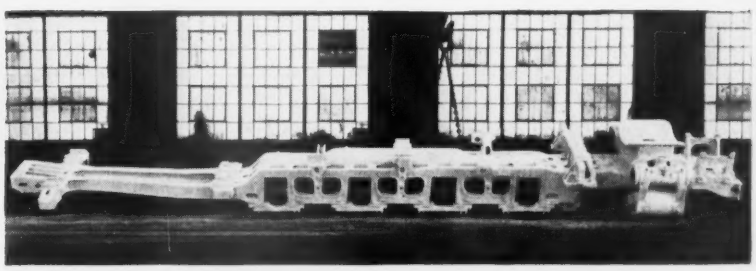


and

sound castings require skill, plus . . . the BEST of Materials!



A cast steel 4-wheel truck frame used on railway passenger cars where soundness is a must!



Cast steel locomotive bed made by General Steel Castings Corporation, Granite City, Illinois, another American Silica sand user.

..*THAT MEANS*...Sand from AMERICAN SILICA

It takes great technical skill all the way from the pattern shop to the cleaning room to produce intricate castings like these made by General Steel Castings Corporation. They must meet the rigid purchasing specifications of the American railroads.

There's another important factor, too. It takes top quality materials to produce perfect castings. The sand used must be carefully chosen to be sure it is backed by exacting quality control. That's one of the reasons why General Steel Castings Corporation of Granite City, Illinois, uses sand from the American Silica Sand Company.

You can safely rely on the quality control behind sand from American Silica. And don't forget the free technical service offered by their traveling sand technicians!

American
Silica Sand Co.
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Suppliers of: Crude and dried crude silica sand • *SULTRON*® flux • Australian zircon sand • Zircon flour

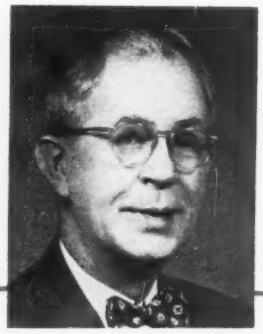
®*SULTRON* is the trademark of Westvaco Chemical Division, Food Machinery and Chemical Corporation, for its brand of sodium sequicarbonate

MAN-TO-MAN

on the Molder's Bench

"Different Worlds"

By RALPH L. LEE



VISITED another fine bunch of foundrymen the other day who were doing fine work in a fine foundry setup. It's amazing how these circumstances always go together and how the by-product of the combination is invariably good housekeeping—of course, it might be the other way around. But regardless of which comes first (the chicken or the egg) good houskeeping is part and parcel of it, including the boss's desk.

I have never been able to explain it, even to myself, but whenever I visit a bang-up outfit the controller, head bookkeeper—or whatever the money-bags is called—will usually turn out to be particularly interested in the man-to-man relationships in his outfit. Maybe he sees the dollar and cents pay-off in such relationships.

In any event, the executive vice president and controller of this foundry ushered me through the plant. He rather surprised me by the amount of molding tricks and technical dope he had stored away in his noggin, but the thing that pleased me most was the way he high-lighted the trip with outstanding examples of a keen human understanding and wholesome working relationships.

I could almost write a book on all he told and showed me, but I believe the part of the trip I got the biggest bang out of was the open-hearth department and particularly the boss who ran it. If someone had tried to describe how spick-and-span this operation was, both from the front and from the back, I would have had to take it with quite a pinch of salt.

As I ohed and ahed my appreciation I could see from the boss' face that I had made a friend of him for life. I don't care how many times I look at open hearths, I always get a thrill that's hard to describe. Standing up there at the charging level the three of us could look out over the entire floor where the boys were pouring off three long rows of king-sized flasks, all lined up like soldiers.

The whole scene was interesting, including the crane, but what especially caught my eye was the fellow operating the stopper on the big ladle. I could see that he not only knew his business, but he knew he knew it and, from the little flourishes he tossed off now and then, he also knew that everybody else knew he knew his business.

"Tell me about that fellow," I said to the boss, who was all cocked and primed to do it anyway.

"Sammy's quite a character," the boss said. "He honestly believes this place would fold up without him and he *is* good, but of course not quite *that* good."

"I can see from way back here that he holds his head sort o' high."

"He has one bad habit though."

"Oh?"

"Whenever we have to work Saturday the son-of-a-gun lays off on Monday."

"Well—what does he do when you give him the facts of life?"

"He goes into sort of a temperamental tizzy."

"Just what form does this tizzy take?" I asked.

"After explaining how busy we are with defense and all, and how much we depend on him, I'll say, 'Sammy, if you've got to take a day off, why don't you warn me so I can pick a day that will not gum us up so badly?'"

"That should have straightened him out," I said.

"But it doesn't. He just turns his head away with watery eyes and later between heats I'll be sure to find him, sitting right down there under the stairs, staring at nothing on the floor. After one of these spells I'll bet he came to my office four separate times with nothing particular to say but with the question written all over his face as to whether I had lost faith in him or didn't love him any more. But doggone it, in spite of all this rigamarole, he still lays off on Monday after overtime on Saturday."

"Congratulations!" I said.

"And for what?" he asked.

"For learning to know that cookie well enough to keep your shirt on and to use him to the best possible advantage in spite of his perinicious lay-off infection," I replied.

"In this day and age, what else is there to do?" he asked. Then he continued, "now you take that fellow over there—don't look now—he's been with us for over thirty years, and I'll say to anybody he certainly does know melting inside and out. I wouldn't dream of bawling him out when he slips up once in a while, for who is there who doesn't slip? Some time back in passing his furnace I noticed that his spout wasn't all that it should be. Later after a round of chores I just happened to drop in on him and said just casually like, 'Joe, when you find time (and he had plenty of it at the moment) take a look at your spout.' Now, knowing him as I do, I knew that any further instructions would have been just plain silly, for just as soon as he saw what I had seen in his spout I knew he would fix it up."

We then climbed down off our perch and headed for the door when I said, "Hey! wait a minute. I've always wanted to see how these ladle stoppers are made. In fact, I've been sort o' figuring on rigging me up a little bottom-pour ladle for the Lee Hobby Foundry."

Instead of lamming right into an explanation the boss yelled, "Hey Johnny! Come over here a minute," and Johnny shuffled over.

"Johnny, meet Doc Lee. He's in town to speak before our Chamber of Commerce banquet tonight and he runs a little one-man foundry in his

(*Concluded on page* 213)

in this briefcase

. . . you may find YOUR answer to MORE castings per man-hour . . . and LOWER COSTS!

Not in one briefcase of course . . . or in one man . . . but in the combined experiences of the Knight Staff of more than 80 Engineers you will find a practical, economical solution to any of your operating or management problems.

Whatever you need to improve your production and cost picture today, the Knight Organization can draw upon years of successful management and production experience in all types of foundries.

Investigate the advantages of a modernization program for your foundry now. Call or write our New York or Chicago office for immediate attention.

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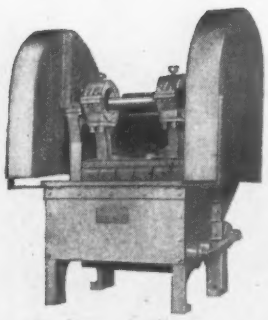
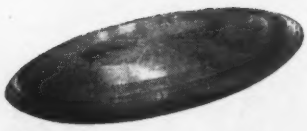
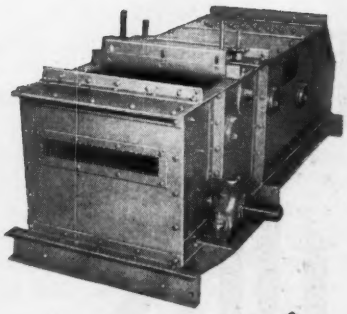


Newaygo Core and Refuge Crusher quickly returns its cost in salvaged material. It also crushes slag for iron reclamation, separates gaggers and rods for re-use.



Newaygo Foundry Turntable — Standard sizes 8′ to 24′. Segmental construction. Interchangeable gear sections. Variable speed drive. Underpan with plows handles spillage through grates.

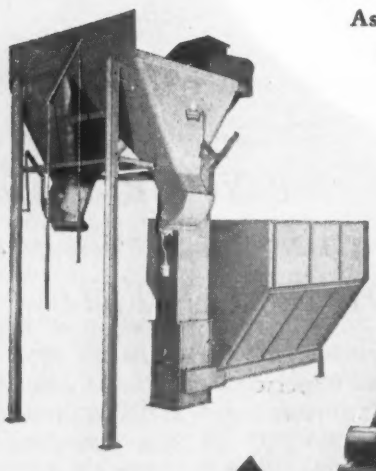


Newaygo Aerator efficiently and economically tempers, cools and blends foundry sand to a uniform consistency. Made in sizes for any sand handling system.

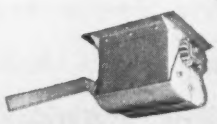
Put your floor space to work More Efficiently with NEWAYGO equipment

You can get more work from every foot of floor space in your foundry with Newaygo equipment that's designed for your specific requirements. A single new machine often increases the overall productivity of your entire foundry. Work flows through each operation at the same high speeds. There is no one machine too big or too small. Every machine is the right size and has the right capacity for the job *you* have to do.

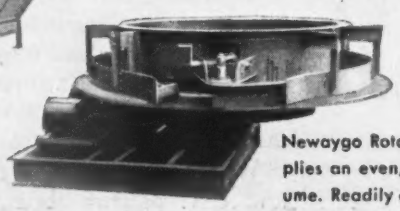
Ask Newaygo Engineers for recommendations that will lower your costs and increase your profits. There's no obligation of course.



The Handy Sandy eliminates hand shoveling for molders and increases their production. With this unit, the molder just reaches overhead and the sand drops into flask.



Newaygo Sand Gates — double undercut type. Available for all bins and hoppers. Geared for easy operation. Hand, counterweight or air operated.



Newaygo Rotary Plate Feeder supplies an even, controlled sand volume. Readily attaches to tanks and bins. Two sizes — capacities up to 100 tons per hour.

Newaygo Mill cuts costs for large users of sand. Salvages sand lumps from screens, separates non-magnetic tramp material and metal which escapes magnetic separator. For systems up to 120 tons per hour.

Send for your FREE copy of this new catalog "PLANNED MECHANIZATION FOR FOUNDRIES". It shows how Neway Equipment will help you mechanize your foundry at low cost.

SEE US AT THE AFS SHOW — BOOTH 1230-1234

NEWAYGO ENGINEERING COMPANY — **NEWAYGO, MICHIGAN**

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

(*Concluded from page* 210)

back yard. He wants to know how you go about fixing up your stoppers."

Johnny acknowledged the greeting of the vice president (still with us), and then howdied his boss. Then on one foot and the other, pretty well tongue-tied in the presence of a stranger, he waited for me to ask him something.

While I sketched a picture of the Lee Hobby Foundry and what I wanted to do in the way of a bottom-pour ladle, I could see his imagination catching hold until he forgot the brass entirely, let himself go and gave me the works man-to-man.

"About this mud you use," I asked, whereupon his boss butted in with, "Johnny invented it."

"Yes suh, I sure did. I takes me one can full of—of course you don't want that much—but"—then he gave me the dope in great detail.

"How long do you bake these stoppers?" I asked as he showed me his ovens.

"Four to five days—that mud's got to get dry. If she don't that steel is going clean on in to the rod, and that's bad."

At that moment, as far as Johnny was concerned, he and I were the only people in the world—his world, in fact, with me just a visitor there.

Best of Friends Must Part

We all had to pull up stakes and move at this point and I didn't like the idea. Neither did Johnny, nor the vice president and particularly the boss. I could see from the boss' face that he had many more things and people to show me. It's a wonderful thing for shop people, who talk the same language and have the same interests and prides to get together and swap ideas and ideals.

In my host's office as we were getting ready to leave for town I said, "Thanks for the space-ship ride you gave me to different worlds."

"What are you talking about?" he frowned.

"Just my imagination running away with me—but I still want to thank you for the opportunity you gave me to visit the private world of Johnny, the melter, Sammy, the boss and, yes, yours."

"I can't say as I just follow you," he said.

"Well," I went on, "I couldn't help but think, that as far as each of these folks are concerned the whole world turns around him personally, including you. It's a wonderful thing where folks in a shop are permitted to have these personal worlds; not only to have them, but to have them recognized and respected by their associates and their bosses. From what I have seen today I imagine that you have done just that, and this recognition and respect plays no mean part in your company's splendid performance and business success."

To which my host replied, "We're sure of it."

Everywhere I go some owner, manager or boss of one kind and another asks me how we are going to get the shop folks to let themselves go and do what they could do if they felt like doing it. Up until this visit I didn't have a pat answer to give them, but from now on I think I'll suggest some space-ship trips to the private worlds of the people they've got to have to carry on their business. This, of course, will mean putting on the *must* list the job of getting acquainted—personally acquainted on a man-to-man basis—with every Tom, Dick and Harry in the place and then staying acquainted by regular visits to these personal worlds. Given the time it takes to do this, the rest will follow even as day follows night.

"I have never *known* a man I did not like"—Will Rogers.

SLY TUMBLING MILLS

THE STANDARD OF STURDINESS

The SLY name on your Tumbling Mills has been the Standard of Sturdiness for many years.

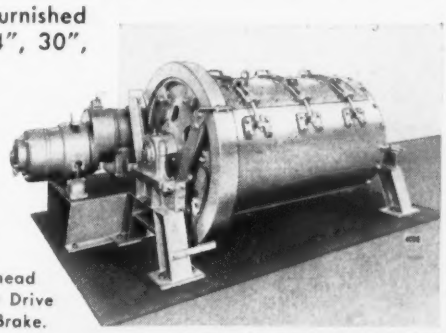
MODERN DESIGN THROUGHOUT — Anti-Friction Bearings, Direct Motor Drive.

STURDY CONSTRUCTION for Long Life, Low Maintenance.

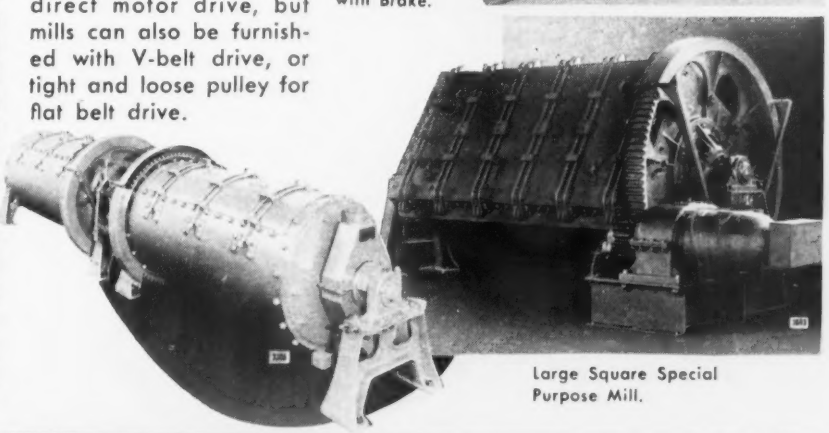
SLY TUMBLING MILLS can be furnished as follows: Inside diameters: 24", 30", 36", 42", and 48". Inside length from 36" up.

SPECIAL DESIGNS for Stove Plate, Soil Pipe, Waterpipe Fittings, Sprue Cleaning, Welding Rods, Cast Anchor Chain.

DRIVES FOR MILLS
For greatest flexibility we recommend individual direct motor drive, but mills can also be furnished with V-belt drive, or tight and loose pulley for flat belt drive.



Gearhead Motor Drive with Brake.



Large Square Special Purpose Mill.

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4753 TRAIN AVENUE • CLEVELAND 2, OHIO
BRANCHES IN:
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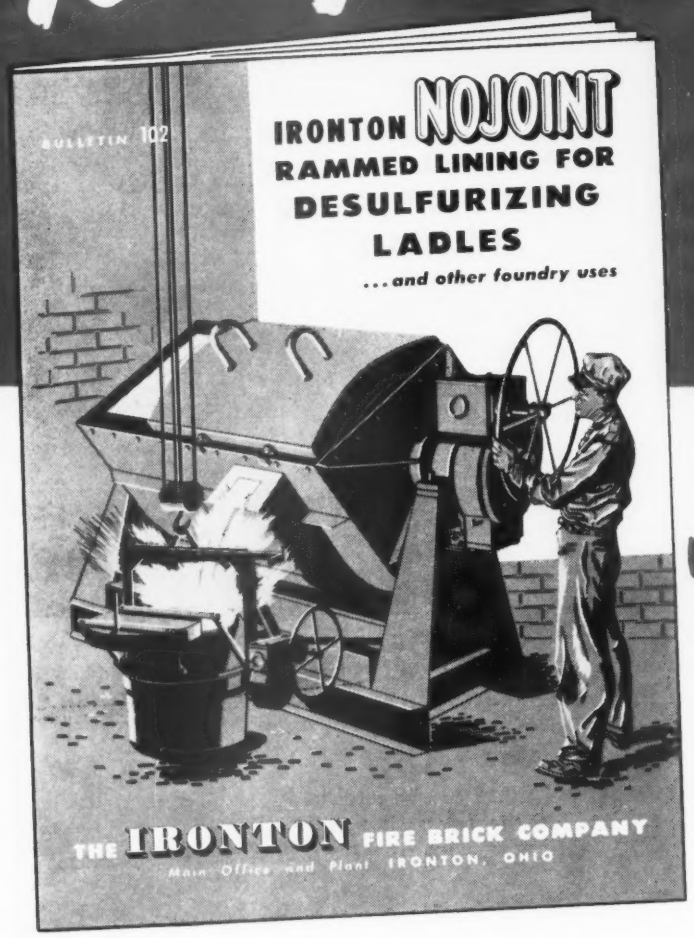
Ready now... to help you save money on every lining for DESULFURIZING LADLES

(and in other foundry applications)



8 Pages of "How to do it"

TEXT and DIAGRAMS

There's crystal-clear information in this Bulletin 102, just what you need to guide your foundrymen when they install monolithic linings in desulfurizing ladles. We have made a small printing and suggest that you write promptly for your copy. You'll find that *Ironton* NOJOINT is the right refractory for ramming up ladles . . . and our words-and-pictures will help you get the greatest service from this plastic, easy-to-handle lining material.

No obligation, gentlemen. Request your copy today

4 times the service – 2/3 the cost

Case histories we can send you will verify NOJOINT performance claims. Wherever "'Purite" is used for desulfurizing, *Ironton* NOJOINT is the preferred monolithic lining. Its refractory mineral base is highly resistant to corrosive action of soda ash slags, relatively stable and non-spalling. There are no joints to make trouble when you line with *Ironton* NOJOINT. Keep pouring better metal . . . with Ironton RELIABLE REFRACTORIES.

THE IRONTON FIRE BRICK CO.
Ironton, Ohio

We are interested in anything that will save money in our foundry. Please send us a copy of the new Bulletin 102 on *Ironton* NOJOINT Rammed Lining for Desulfurizing Ladles . . . and other foundry uses.

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THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

BERLITE • ALSET
CARO-LINE • NOJOINT • SPECIAL SHAPE REFRACTORIES
• KENTUCKY CLAY FIRE BRICK PRODUCTS

Molding Machines

(*Continued from page* 105)

molding machines and they have considerable influence on mold production. The productivity of any molding machine is usually limited by the capacity and speed of the allied service and handling facilities employed.

The development and use of automatic and semiautomatic controls on both molding machines and core blowers has also had wide acceptance by foundries in recent years. Automatic controls on a machine in general will not function on any faster cycle than can be attained with manually operated valves. They do, however, free the operator to perform other tasks such as setting cores, closing molds or stripping coreboxes while a subsequent one is being automatically rammed. This, of course, results in increased production per man-hour.

In some foundries employing piece rate systems, automatically controlled machines have been responsible for improved quality of molds and cores which, in turn, has reduced foundry scrap. Automatic controls provide the operator the necessary time to inspect each core or mold as it is made, without sacrificing production. This has also reduced the down time of the machine due to maintenance on coreboxes, patterns and flasks.

Automatically controlled machines cannot be justified in all types of installations. However, when correctly applied, increased quality of mold and cores and increased production per man-hour usually results. Also, the automatic controls sometimes permit the use of a lower class operator by providing a single operating lever or push button for the machine. In some

"Watch that corner . . . turn right . . . watch that curve!"

GYRATORY FOUNDRY RIDDLES

Saves Up to 90% of Screening Labor Costs

Type CS Riddle

Save more with Combs Gyratory Riddles in screening moulding and core sands, medium fine and coarse dry materials. Sifts . . mixes . . fluffs . . aerates up to 30 times faster. Combs Gyratory Riddles are sturdy, simple to operate, fully enclosed and cost less than 1c an hour for power. Fractional horsepower motor does the work. Quickly removable steel-rim sieves can be removed, emptied, and replaced in a matter of seconds.

TYPE "CS" (illustrated) has automatic discharge of gaggers, refuse, etc. Lets man do continuous shoveling. Only $320.00 f.o.b.

TYPE CR—24" round screen, without automatic discharge (screen removed, cleaned, replaced in 5 seconds) $310.00 f.o.b.

Prompt Delivery from your Foundry Supply House
Send for FREE Descriptive Folder

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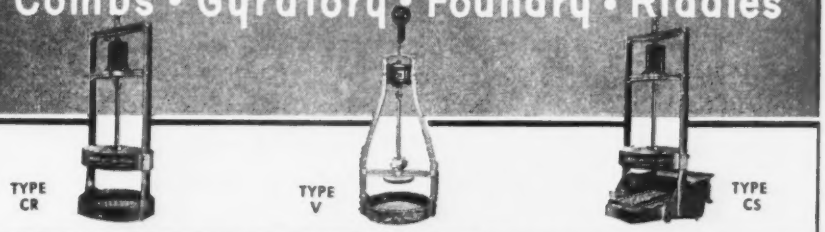


GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

cases the insertion of the corebox alone will initiate the cycle.

Electrical type control units with a timer and solenoid valves are used on a majority of machines, but on some core blowers complete air operated sequential controls are available. To date, most automatically controlled molding machines are of the jolt-squeeze-strip type, which is more universally used by production shops.

On machines with full automatic controls the cycle is manually initiated by the operator after the flask has been filled with sand, and terminated when the mold is stripped from the pattern. Repetitive automatic cycles on molding machines are not as yet, in my opinion, too practical because of today's limitations on handling equipment servicing the machines, and the safety element for the operator.

The semiautomatic controls on jolt-squeeze-strip molding machines operate essentially the same as fully automatic controls except for a break in cycle after the jolting operation. This break permits the operator to manually level or add more sand, after jolting, before the automatic squeezing and stripping operations are performed.

On core blowing machines the automatic cycle is manually initiated after the corebox is in the blowing position on the table, and is terminated after the core is blown and either drawn for the draw type machine or the box automatically ejected for the diaphragm type machine. Automatic controls are available from most manufacturers for either the diaphragm or draw type core blower. These controls can be either compressed air or electrically operated.

The increased production capacity of modern molding machines and core blowers can, at least in part, be attributed to:

1. Greater squeeze pressures developed in the machines by use of larger squeeze pistons.
2. Improved handling and conveying equipment built for servicing the machines.
3. Better utilization of manpower through the use of semiautomatic or automatic controls.

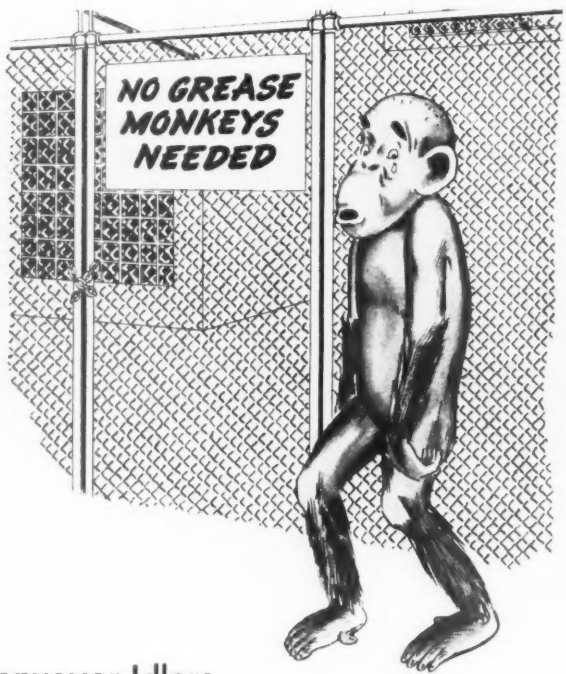
Future designs of molding machines and core blowers will include more extensive use of automatic controls. New types of handling equipment will be developed and either incorporated into our machines or will work in conjunction with them. This will increase production, based on present foundry standards. Furthermore, the molding machine industry is not too far away from the incorporation of sand handling equipment into some machines.

It is also quite possible that the present production lines, consisting of a number of machines serviced by one sand system and one pouring conveyor, will be obsoleted by a number of highly mechanized, smaller individual molding units. These molding units could conceivably be set up to handle only one size flask, and consist of one drag and one cope machine, surrounded by elaborate automatic handling and conveying equipment.

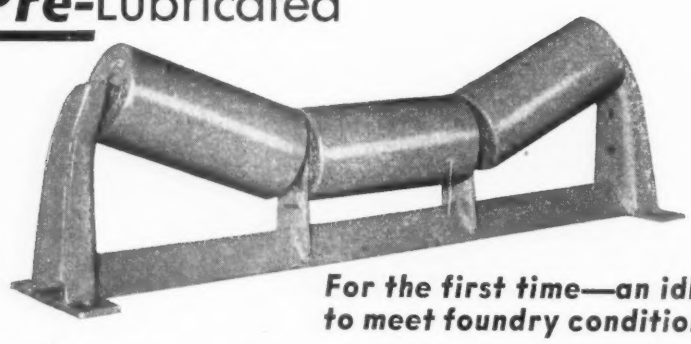
Free Patents Are Listed

The Government Patents Board has listed 2339 patents in a publication entitled "Government-owned Inventions for Free Use." Developed in federal research programs the patents cover a wide range of products and processes, new uses for raw materials, and new methods of handling mechanical problems. Booklet may be obtained through field offices of the U. S. Department of Commerce or from the U. S. Government Printing Office, Washington, for $1.

Out of luck since Transall took over



Transall Belt Conveyor Idlers
Pre-Lubricated



For the first time—an idler to meet foundry conditions.

Pre-lubricated with a high quality lubricant which stands up under high temperatures (melts at 378°), material and labor of lubrication are eliminated, belt life is prolonged, and other maintenance costs reduced.

TRANSALL INC.

Manufacturers of a complete line of Belt Conveyor Equipment

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ILLINOIS
CLAY PRODUCTS
WIDELY USED FOR ALL FOUNDRY PURPOSES!
GOOSE LAKE FIRE CLAY BRICK
Well burned to assure high density, low porosity and uniform dimensions. Excellent resistance to slags, spalling and abrasion.
GOOSE LAKE GROUND FIRE CLAY
Smooth, plastic fire clay with good refractoriness and low drying shrinkage. Ground and screened to about 12 mesh with particle sizes ranging downward to micron size. Most widely used ground fire clay on the market.
GOOSE LAKE FIRE CLAY FLOUR
Extra fine clay for bonding sand, laying fire brick and for mixing cupola and ladle linings. Finely pulverized, works readily with water, spreads easily.
GRUNDITE BOND CLAY
For bonding foundry molding sands—especially malleable, hard iron and light to medium grey iron castings. Grundite bonded sands improve casting finish, reduce scrap and help produce castings closer to pattern size.
GOOSE LAKE SILICA MIX FOR CUPOLA PATCHING
Made with Goose Lake Fire Clay and angular silica, ground and screened to produce a dense lining with high resistance to slag and erosion from the charge. High adherence for manual or gun application.
Write for new descriptive folder
ILLINOIS CLAY PRODUCTS COMPANY
JOLIET, ILLINOIS
SINCE 1911

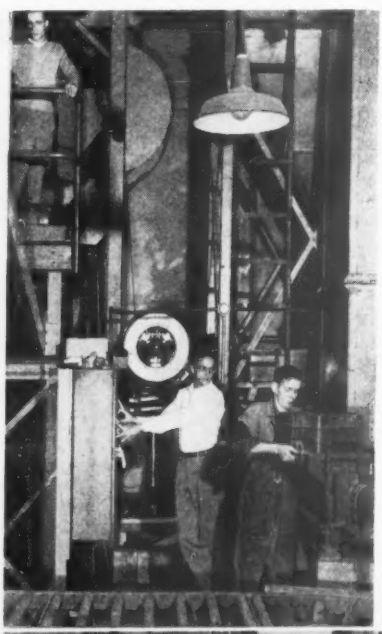
Industry BRIEFS

NEARLY $10 million was spent by leading malleable iron foundries in 1951 for mechanization and modernization, according to a survey made by the Malleable Founders' Society. Most of the money was spent for new equipment, only a small part going for new buildings. The industry's annual capacity now is placed at about 1,200,000 tons.

Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago, now is handling the complete line of foundry machinery formerly manufactured and sold by the Champion Foundry & Machine Co. All sales and service will be conducted by the Beardsley & Piper organization through its general offices in Chicago. Manufacturing will continue at the Champion plant at Rockford, Ill.

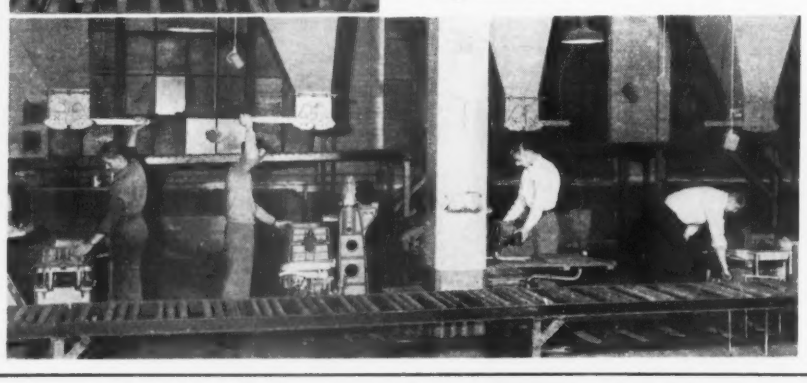
University Installs Foundry Sand Equipment

NEW sand preparation and distribution system valued at $70,000 has been installed at Ohio State University's foundry laboratory, Columbus, O. The equipment was donated to the college by 20 industrial firms in five states. At left, upper left, a student is shown standing on the mixing platform, below which a portion of the distribution belt is visible. Student at center is operating a control panel. Behind him is a sand-weighing scale and skip hoist. Student at right is removing a flask from the shakeout. The bucket elevator behind the shakeout feeds the sand storage hopper shown in background.



Below, students are operating four of the seven molding machines, each served by an overhead sand hopper. Both levels of a mold conveyor can be seen in the background.

Dr. Douglas C. Williams, a member of the industrial engineering department faculty, was instrumental in obtaining the equipment from the various firms. The university offers eight foundry science courses in its industrial engineering curriculum.



Morris, Wheeler & Co., Philadelphia, has purchased the Industrial Monorail & Conveyor Co., a division of W. H. Sink Iron Works, Philadelphia. The purchased company will operate as the Monorail & Crane Division of the parent company and will continue the manufacture of monorails and motor-driven manual and jib cranes. R. T. Wiley, who directed operations of Industrial Monorail, will continue as manager of the new division. Former sales representatives in various states will be retained.

* * *

Hewitt-Robins Inc., will move its headquarters offices from 370 Lexington Ave., New York, to Stamford, Conn., about April 1. Eastern Division and Export Sales offices of the Hewitt Rubber, Restfoam, and Robins Conveyors Divisions will remain at Lexington Ave.; offices of Robins Engineers Division will continue at 157 Chambers St., New York.

* * *

Universal Die Casting & Mfg. Co., Saline, Mich., has purchased Veremere Corp.'s aluminum die casting plant at Malvern, Ark. It will be operated as the Glenvale Products Corp., a wholly-owned subsidiary of Universal. L. A. Hughes is general manager, and E. A. Nadle, who was with Veremere Corp., will continue as sales manager.

* * *

Reed Roller Bit Co., Cleco Division, Houston, Tex., manufacturer of air tools and accessories, has appointed George W. Cassady Co., Sylvan Dell Rd., Williamsport, Pa.; Davenport Engineering Co., 415 West Third St., Davenport, Iowa, and Monogram Air & Power Equipment Inc., 125 Olive St., New Haven, Conn., distributors in their areas.

* * *

Love Brothers Inc., 140 Stone Ave., Aurora, Ill., has changed its officers. They are: Robert F. Grover, president; Benjamin C. Griswold, vice president in charge of machine shop; Robert S. Hendry, vice president in charge of foundry, and Bernice Nashold, secretary and assistant treasurer.

* * *

Lanham Foundry Co., 29 Central St., New Martinsville, W. Va., a 30-year old brass and aluminum foundry, has been incorporated by C. K. Lanham, Helen Block, and Orley G. Curd, all of New Martinsville.

* * *

The plant recently acquired in Portsmouth, O., by Dayton Steel Foundry Co., Dayton, O., manufacturer of brake drums and steel castings, has started production. It is

Incorporated in Ohio as the Dayton-Portsmouth Foundry Co. Officers are: George Walther Sr., chairman of the board; John Walther, president; George Walther Jr., vice president; J. A. Graham, secretary; S. A. Macy, treasurer; N. R. Burger, assistant treasurer, and Gale Call, foundry superintendent.

* * *

The U. S. Corps of Army Engineers' new 24-million-volt betatron, the first to be constructed in the Middle West for commercial production, is being operated by General Steel Casting Corp., Granite, City, Ill. Primary function of the betatron is to inspect ordnance steel castings.

* * *

Foundry Sales & Service Associates Inc., Whitesboro, N. Y., has been incorporated to deal in foundry supplies. Directors are: C. I. DeShong, 182 Proctor Blvd., Utica, N. Y.; Don J. Merwin, Five Jordan Rd., New Hartford, N. Y., and C. I. DeShong Jr., 60 Mountain St., Clinton, N. Y.

* * *

Electric Steel Treating Co., Bordentown, N. J., specializing in heat treatment of tools and dies, has begun operations. John B. Guthrie Jr. is preseident and Robert W. Guthrie is secretary-treasurer. Edward W. Lerch, formerly with Bethlehem Steel Co., is plant superintendent.

* * *

Diez & Hynson, 440 Front St., Baltimore 2, nonferrous castings and machine shop work, is erecting a plant at 2800 Boston St. The one-story, 33 x 72-ft building is expected to be ready for production early this spring. Carl C. Diez is owner.

* * *

Rockwell Mfg. Co., 400 North Lexington Ave., Pittsburgh 8, has transferred its Delta Power Tool Sales Division from Milwaukee to Pittsburgh. R. P. Melius, vice president of power tool sales, and his staff, now are in the Pittsburgh offices.

* * *

Hydro-Blast Corp., 2550 North Western Ave., Chicago 47, has formed a wholly-owned subsidiary, Hydro-Blast Trading Corp., for handling its business activities in the Western Hemisphere outside the United States.

* * *

International Graphite & Electrode Corp., subsidiary of Speer Carbon Co., St. Marys, Pa., is constructing new graphitizing facilities to cost $10 million at its Niagara Falls plant.

* * *

Johnson Bronze Co., New Castle, Pa., has started production of universal bronze bars at its new foundry on Mahoning Ave.

handles everything from core sand to castings

Kwik-Mix Moto-Bug carries up to 1500 pounds or 10 cu. ft. (struck) of bulk materials each load . . . handles sand, scrap, slag, coke, small castings and any other materials that can be shoveled, stacked or loaded into its big capacity hopper. This low-cost power wheelbarrow climbs 20% ramps fully loaded, turns in its own length . . . 33" width clears crowded aisles, narrow doorways. Moto-Bug has full power forward and reverse for traveling, backing or spotting . . . large steering wheel, with 3.6-to-1 gear ratio, for effortless steering and maneuvering . . . instant gravity dump with snub-line control. Interchangeable attachments: flatbed, 5-foot fork lift, and scraper.

Hauling castings from cleaning room to storage . . . delivering sand to mixers or molding stations . . . handling coke and slag around ovens . . . cleaning up scrap in shop and yards. There's no limit to Moto-Bug usefulness in foundries and metal-working shops.

Equipped with 1500-lb. flat-bed, Moto-Bug handles flasks, cores, large castings. Sturdy 4-ft. platform has stake pockets for adding side-boards, tilts for easy pull-away when unloading.

Mail Now to: **KWIK-MIX COMPANY, Port Washington, Wis.**

Send us complete information on Moto-Bug with: ☐ hopper ☐ flatbed ☐ fork lift ☐ scraper blade

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COMPANY ..... DEPT. .....
STREET .....
CITY ..... STATE KM256FO

KWIK-MIX (Koehring Subsidiary) "NO PUSH — NO PULL" Moto-Bug®

Aluminum Association Holds Annual Meeting

Progress reports on the aluminum industry's expansion program held the spotlight at the annual meeting of the Aluminum Association in New York, Jan. 22-24. Current industry problems were discussed in separate sessions held by the association's four active commodity divisions.

A. P. Cochran, Cochran Foil Co., Louisville, was re-elected association president, and Arthur V. Davis, Aluminum Co. of America, was re-elected chairman of the board. Vice presidents re-elected were: I. T. Bennett, Revere Copper & Brass Inc., Baltimore; L. M. Brile, Fairmont Aluminum Co., Fairmont, W. V.; and E. G. Fahlman, Permold Co., Medina, O. Donald M. White was reappointed secretary-treasurer.

L. E. DeGroat, Permold Co., was named to head the foundry division and Harry J. Hater, Aluminum Industries Inc., Cincinnati, to represent the division on the board.

Samuel W. Anderson, deputy administrator for aluminum, Defense Production Administration, spoke at the meeting. He stated that the aluminum industry's expansion program is on schedule and will be completed next year provided tnere are no requests for additional expansion.

BERYLCO BERYLLIUM COPPER FOR SAND, PRESSURE AND INVESTMENT CASTING

Berylco casting alloys produce uniformly good results with all of these casting techniques.

Advantages of Berylco casting alloys. Excellent fluidity provides maximum detail, smooth surfaces, good dimensional control, uniformity over long runs, and minimum machining. Low melting temperature simplifies handling and pouring. High strength and hardness, good conductivity, resistance to wear and corrosion, and heat-treatable characteristics offering property combinations not otherwise available—these are reasons for specifying Berylco casting alloys.

Processing Berylco Beryllium Copper castings. In contrast to other materials, the higher strength Berylco alloys can be machined soft or annealed, then hardened with a simple low-temperature treatment. The high conductivity Berylco alloys are readily machined when fully heat treated.

OUR CASTING SPECIALISTS WILL BE GLAD TO CONSULT WITH YOU ON ANY OF YOUR FOUNDRY PROBLEMS. WRITE TODAY.

Send for "Cutting Costs with Beryllium Copper Molds"; "Beryllium Copper Investment Castings"; "Sand Casting Beryllium Copper."

ALLOYS AVAILABLE IN 5 LB., 2½ LB. AND 3 OZ. INGOTS

Properties of Berylco Beryllium Copper Casting Alloys

Annealed and Heat Treated Properties	Berylco 20C	Berylco 275C	Berylco 10C and 50C
Tensile Properties			
Ultimate Tensile Strength	150-175,000	140-165,000	95-120,000
Proportional Limit (0.002% Offset)	105-125,000	85-115,000	45- 65,000
Yield Strength (0.20% Offset)	120-155,000	110-125,000	55- 85,000
Elongation, % in 2 in.	1-5	1-5	5-15
Rockwell Hardness	C38-45	C42-48	B92-100
Electrical Conductivity, %	20-25	18-23	45-50

BERYLCO THE BERYLLIUM CORPORATION

DEPT. 2C, READING 8, PENNSYLVANIA

British Steel Founders' Annual Meeting

At the recent annual general meeting of the British Steel Founders' Association, T. H. Summerson, chairman and joint managing director of Summerson's Foundries Ltd., Darlington, was elected chairman.

Mr. Summerson, a grandson of the founder of the business, begun in 1840, joined the company in 1922. The steel foundry was then carried on by what is now the parent company, Thomas Summerson & Sons Ltd. Mr. Summerson represented his company at meetings of the former General Steel Castings Association and was a member of the committee whose report provided framework for the subsequently formed British Steel Founders' Association, organized in 1944, and which elected him vice chairman in 1949. In 1940 Mr. Summerson was appointed director for steel castings in the Ministry of Supply, Iron and Steel Control and since last November he has been chairman of the Northeast Coast Association of Steel Founders.

T. H. SUMMERSON F. W. ROWE

Following the election, Mr. Summerson presented an illuminated address and a 17th Century bracket clock to Frank W. Rowe, retiring chairman, the association's recognition of his services.

International Standards

The cast iron and cast steel committee is one of 11 technical committees of the International Organization for Standardization which will meet in New York in connection with the triennial meeting of the ISO at Columbia University, June 9-21, 1952. American Standards Association, U. S. member of the ISO, will act as host.

"We cut fuel costs in half!"

CONTROL DATA		
LINING	**MAX. FUEL CONSUMPTION**	**CONTROL**
Ordinary Firebrick	**1,000,000 BTU/HR**	**100 to 150F Overshoot of Critical Pouring Temp.**
B&W Insulating Firebrick	**500,000 BTU/HR**	**No Overshoot of Critical Pouring Temp.**

THE CHART ABOVE shows how B&W Insulating Firebrick slashed fuel bills by 50% and provided close temperature control when it was used in place of ordinary firebrick in a crucible type furnace melting magnesium. Similar savings were also made on identical units melting aluminum. • The reason for this superior performance is that lightweight B&W Insulating Firebrick store and conduct less heat, thus provide faster heating up time and lower fuel consumption. These brick also respond rapidly to changes in heat input, assuring excellent temperature control.

The defense plant expansion program has created unprecedented demands for B&W Insulating Firebrick. It is, therefore, necessary to anticipate your requirements as far in advance as possible.

KAOCAST FLOOR TAKES PUNISHMENT

In this same furnace, a floor of B&W Kaocast, the 3000 degree refractory castable, withstood the spillage of crucibles . . . eliminated the need to renew the floor every time a crucible was replaced.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

R-384

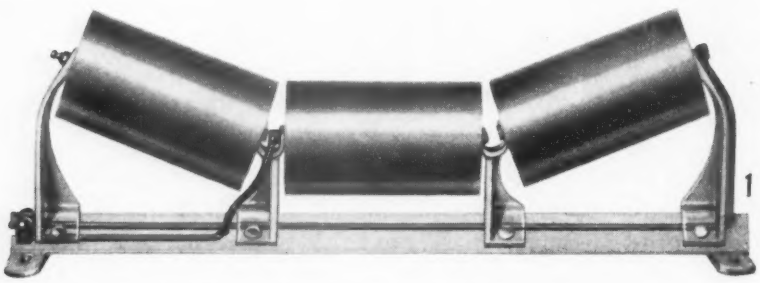
B&W REFRACTORIES PRODUCTS—**B&W Allmul Firebrick** • **B&W 80 Firebrick** • **B&W Junior Firebrick** • **B&W Insulating Firebrick** **B&W Refractory Castables, Plastics and Mortars** • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

New EQUIPMENT *and Supplies*

For Additional Information on these Items Use Reply Card—Page 225

(1)—Idler Lubrication: Chain Belt Co., 1600 West Bruce St., Dept. PR, Milwaukee 4—Belt conveyor idler greasing equipment utilizes reinforced flexible automotive type grease tubing designed to take high gun pressures. The flexible sections are made in lengths which allow them to hug the inside of the inverted angle or channel base. Grease tube extension to the far side is accomplished by threading a flexible section through the base to the grease fitting at the near side. Location of grease fittings has been changed to make them accessible for servicing at any time. They are protected during shipment by the idler base.

For More Details Circle No. 1—Page 225



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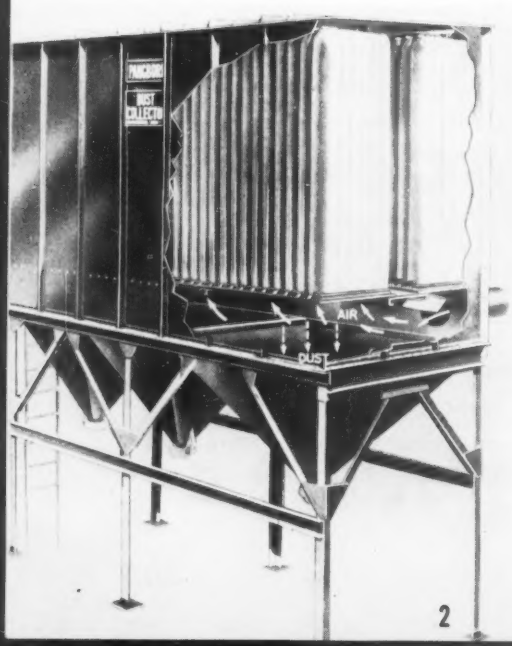
(2)—Dust Collector: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Cloth bag collector for metal oxides and other dusts with similar characteristics features simplified design of filter bags and mechanism for reclaiming dust from the bags. The cloth bag dust collectors range from 5 to 40 ft long, contain 1360 to 10,880 sq ft of filter cloth, employ from one to six hoppers, and are supplied with appropriate structural supports to furnish the type of disposal desired—wheelbarrow, car, truck, etc. In operation, dust-laden air piped from the plant enters the collector through grid openings in the collector floor. The air loses velocity and the heavier particles fall immediately into hoppers. The air then rises through the grid into filter bags sealed over each grid opening. Dust captured in the bags is removed by shutting down the exhauster and turning on the shaker motor. Dust shaken from the bags falls through the grid openings into hoppers, equipped with a valve at the bottom for discharging dust.

For More Details Circle No. 2—Page 225

(3)—Magnetic Inspection: Magnaflux Corp., 5900 Northwest Highway, Chicago 31—Re-engineered units for magnetic particle inspection can handle greater diversity of parts, and, in most cases, have greater capacity. They are built for interchangeable 220 or 440 volt, 60-cycle operation. The equipment pictured is a 96-in. capacity, wet-type, direct-current unit of 5500-amp magnetizing current output. A separate demagnetizer is required. Direct current units give good indications of subsurface discontinuities which alternating current will not reveal. Use of alternating current, however, eliminates interpretation problems, decreases background interference, and allows small surface discontinuities to give clear indications. Also parts



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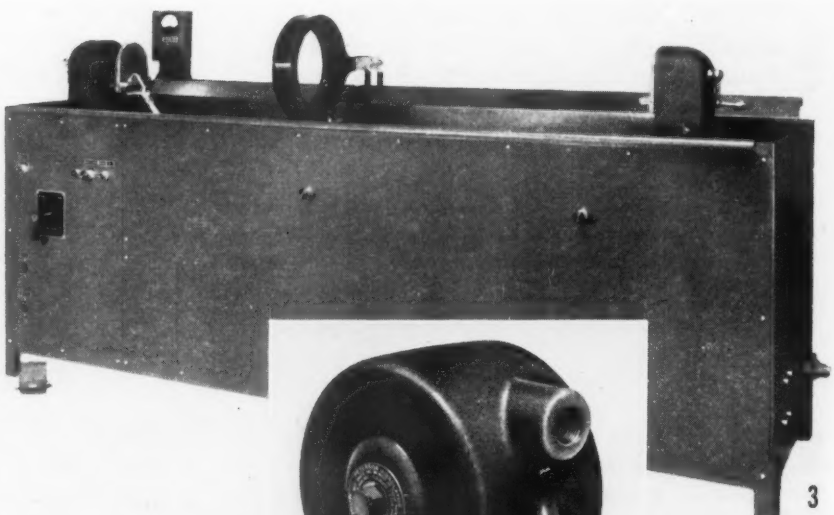

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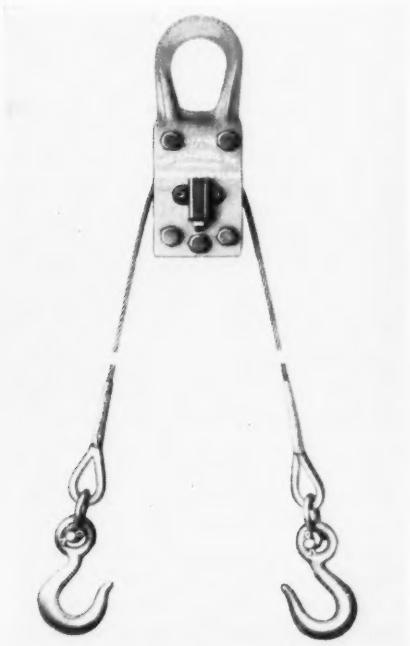
may be demagnetized on the same unit. A circulation system is incorporated in each unit to maintain uniformity of bath and efficient application of bath to magnetized parts, permitting either the wet-continuous or wet-residual method of inspection. Portable units of the dry type, using powder as the inspection medium, will operate on either 220 or 440 volt, 50-60 cycle ac and put out either alternating or direct magnetizing current.

For More Details Circle No. 3—Page 225

(4)—Hopper Vibrator: Martin Engineering Co., Kewanee, Ill.—New vibrator is designed to provide powerful all-directional vibration that moves materials without damage to faces of hoppers or bins. It has one moving part—a 2-in., 1-lb ball which is driven pneumatically around a stationary, hardened and finish-ground two rail race, to provide vibration. It is said to be self-starting, quiet in operation, and to require no lubrication.

For More Details Circle No. 4—Page 225

Self-Adjusting Sling: Caldwell Co., Rockford, Ill.—Self-adjusting sling consists of an equalizing unit and a wire rope sling. The equalizing unit is placed on the crane hook and the crane moved to the approximate center of gravity. After the sling legs have been hooked to the load and the crane lifts, the legs—turning on a sheave—adjust themselves to the proper lengths. As the load lifts the weight locks the legs in place and the load is carried level. Two-thirds of the rated load may be imposed on one leg without slippage, it is claimed. If load is to be lifted at a given angle, the operator judges the approximate weight proportion and moves his crane hook accordingly. Sling is made in eight sizes, ranging from ¾-ton to 15 tons capacity.



For More Details Circle No. 5—Page 225

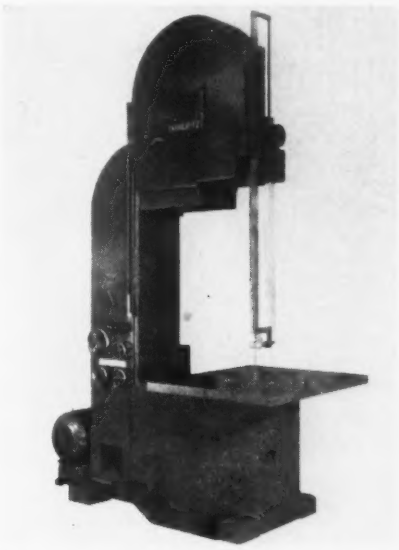
Ear Stoppers: Dr. J. B. Nelson, Dept. I, 8038 Jenkins Arcade, Pittsburgh 22—Plastic ear stoppers, which do not enter the ear canal, are said to be safe and simple to use. They are designed to increase worker efficiency by filtering out loud, irritating noises, but it is said that workers can hear voices clearer with the stoppers in place than without them.

For More Details Circle No. 6—Page 225

Hardness Tester: Peabody Industries Inc., 12129 Hamilton Ave., Detroit 3—Pocket-size instrument for testing surface hardness of nonferrous metals weighs less than 5 oz and is under 5 in. long. Features include direct-reading scales, one incorporating accurately correlated numercial equivalents of the brinell 500-kg, 10-mm ball testing equipment, and the other a metalometer scale. The metalometer scale is graduated numerically in 100 equal divisions and is to be used as a comparator for all accepted nonferrous master specimens.

For More Details Circle No. 7—Page 225

Band Saw: Tannewitz Works, 315 Front St. NW, Grand Rapids, Mich.— Large band saw, designed for sawing magnesium and aluminum castings, has clearance of 55 in. under the guide, is of welded steel construction, and employs 42-in. wheels. All controls, including handwheels for raising and lowering the upper wheel, vertical movement of the guide post, counterweight for varying saw blade tension, and alignment of upper wheel, are within easy reach of the operator. Both wheels are fitted with special outboard bearings, in additon to the conventional bearings, to prevent damage to the machine from extra heavy cutting.



For More Details Circle No. 8—Page 225

Dressing Tools: Christensen Diamond Tool Co., 9607 Traverse St., Detroit 13—Group-mounted and chisel-face wheel dressing tools utilize a number of whole diamonds, mounted in a powdered metal matrix. Group-mounted dressing tools are recommended for large outside diameter straight face applications where high finish is required. Each tool contains five, six, or seven diamonds, so arranged that three to five points are in contact with the work at all times. By rotating the tool in its holder at regular intervals wear is equally distributed among the various points. Chisel-face tools have two or three diamonds mounted in a straight line, and are primarily intended for large diameter, wide-face dressing applications. Diamonds used are whole, natural stones, with the hard outer skin still intact. This outer skin is said to be the toughest part of the diamond.

For More Details Circle No. 9—Page 225

Die Caster: Hydraulic Press Mfg. Co., Mount Gilead, O.—Die casting machine features injection speeds up to 400 fpm made possible by a built-in nitrogen accumulator system. The accumulator bottle, filled with nitrogen, is connected directly to a double acting hydraulic injection cylinder. Hydraulic fluid under pressure forces the injection ram backward, compressing the nitrogen into the bottle. By-passing the hydraulic fluid from the pump and releasing the fluid in the forward end of the injection cylinder allows the expand-

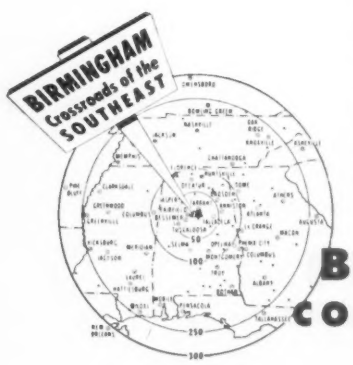
BUTLER
MANUFACTURING COMPANY
chose Birmingham* to serve the *Growing Southeast*

*One of Butler's 5 Large Plants

Butler Manufacturing Company is one of the largest manufacturers of fabricated metal products. After a long study to determine the most desirable location for a plant to serve the Southeast, Butler selected Birmingham. It established recently a large plant on a 40-acre site in Birmingham's western section. This plant is now making prefabricated steel buildings, welded steel tanks and a wide variety of custom-built equipment fabricated from structural steel and steel plates.

"Our mounting sales in the Southeast made it imperative for us to have a plant to serve this growing market," said Oscar D. Nelson, president of Butler Manufacturing Company. "Our study convinced us that no city in the Southeast equals Birmingham's advantages to us for the manufacture and the distribution of our products in that section. Birmingham offered us doorstep steel supply and all accessory items that we needed, such as fittings, valves, welding rods and lumber, produced largely by local or regional enterprises. Birmingham also has a plentiful reserve of skilled labor and adequate power, water and gas. We are more than pleased with the progress of our Birmingham plant and confidently expect its growth to keep pace with the remarkable development of this great district."

* * * * *



Butler is one of many recently established industries that have found the Birmingham district an unexcelled location from which to serve the Southeast. The Committee of 100 or any of the undersigned members of the Executive Committee invite your confidential inquiries for specific data regarding Birmingham's advantages for your plant, office or warehouse.

BIRMINGHAM COMMITTEE OF 100

1914 Sixth Ave., N., Birmingham, Ala.

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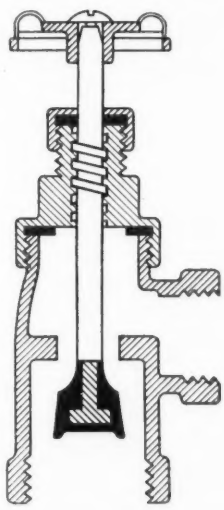
ing nitrogen to force the injection ram forward at a rapid rate to inject hot metal into the die. Speed of plunger advance is regulated by controlling the flow of hydraulic fluid from the forward end of the injection cylinder. Machine was designed for producing aluminum castings up to 12 lb, and may be adapted to brass and magnesium die casting. Maximum die clamping pressure is 400 tons; size of die plates, 38 x 38 in.; daylight opening, 42 in.; die movement, 16 in., and space between bars, 23 x 23 in.

For More Details Circle No. 10—Page 225

Valve Seal: Rodic Chemical & Rubber Corp., Allen Ave., New Bruswick, N. J.—New seal design is said to make possible a valve that is leak-proof, long wearing, easy operating, and comparatively inexpensive to manufacture. Operation of the seal is based on working with, rather than against, the fluid flow. The cone-shaped seal is closed in the same direction as movement of the liquid, allowing high or low pressure to seal the valve. The cup-shaped, conical washer incorporates an imbedded metal plug which eliminates bending and warping. Rubber member of the seal is specially compounded to withstand oil, grease, steam, water, and most industrial chemicals. The seal is adaptable to many present designs of valves and other devices for the control of fluid and gas flow.



For More Details Circle No. 11—Page 225

Conversion Burner: Bryant Industrial Division, 17825 St. Clair Ave., Cleveland 10—Forced-draft, gas conversion burner is produced in 11 capacities ranging from 400,000 to 20 million Btu/hr input. It is shipped factory wired and assembled as a unit designed for easy ashpit installation in furnaces or boilers in large residences, industrial or commercial

(*Continued on page* 227)

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

50. Foundry Buckets

Blaw-Knox Co., Blaw-Knox Div.—Your bucket won't drag if its one of those new 'Shark Tooth' single-line hook-on type that is designed expressly for tough foundry use in rehandling coke with minimum degradation or moving coal, sand and small limestone under average or low headroom conditions. See for yourself—get bulletin 2265.

51. Core Blowers

Redford Iron & Equipment Co.—Are your coremakers tired? Does core production lag at times? If so, you need a No. 2 stationary magazine type core blower. It's so easy to use that record core production can be attained. Get complete details by asking for 4-page illustrated bulletin F.

52. Furnaces, Generators

Holcroft & Co.—When you tuck this multi-paged group of catalogs into your file, you'll really have something. Besides a reprint on hardening bearing balls with shaker-hearth furnaces, there are cataloged radiant tube heating of controlled atmosphere furnaces, batch type furnaces, gas generators, and carbo-nitriding gas carburizing and annealing furnaces. Plus other reprints, too. Whew!

53. Blast It All!

Spencer & Halstead Ltd.—You'll clean up on the info offered in 8-page folder which illustrates and describes the Centriblast airless rotary table blast cleaning machine for fettling or surface preparation of castings, pressings, forgings or welded fabrications. Machine projects abrasive by high speed impeller action, and that's not just air.

54. Freight Car Spotter

Silent Hoist & Crane Co.—You say one man can't move a freight car! Well, he can do it, and quickly and easily, with the style M electric capstan car puller. Both 7½ and 15-hp car spotters are described in 2-page illustrated data sheet 64A. Brief specs are given on other units for jobs where pull is needed. These include Gypsy winches, single and double drum winches and hoists, barge movers, etc.

55. Dumping Hoppers

Roura Iron Works, Inc.—Loaded hoppers dump automatically when latch is operated, and they return to normal position when load is cleared. Offered in ½ to 2 cu yd capacities, both platform and fork types for handling with industrial lift trucks are shown in 4-page illustrated bulletin PM100.

56. Grind Out Products

Standard Electrical Tool Co.—Whatever your grinding problem, you'll find just the right size and type of machine to lick it in 48-page illustrated catalog No. 44. Jammed full of facts on grinding techniques and short-cuts, this book also gives complete data on grinders, buffers, polishers and grinding accessories.

57. Oven Aid

Peters-Dalton, Inc.—Engineered and constructed to individual product needs, ovens produced by this company are described in 12-page technical bulletin 401. Step-by-step procedures used to analyze product heating need, oven purpose, temperature-time cycle are outlined. Don't get hot under the collar because you've a heating problem, just get this booklet.

58. Band Sawing Machine

DoALL Co.—A zephyr is a breeze, and that is what your band sawing will be with any of 21 Zephyr band sawing machine models described and illustrated in 8-page bulletin "The New DoALL Zephyr." The 36-in. machine with wide range of speed selections really tears into castings, wood and lots of other stuff.

59. Rotary Melting Furnaces

Monometer Mfg. Co., Ltd. — Not one, but two bookets, R.3 and W.1, can be had which present illustrative and descriptive information pertinent to rotary melting and refining furnaces and Wellworthy hydraulic tilting truck ladles. Send for them.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

FOUNDRY
Penton Building, Cleveland 13, Ohio

3-52

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7	19	31	43	55	67	79	91	103	115
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60. Whys of Abrasive Cutting

Allison Co.—Because it is not yet April, you'll not be fooled when you send for this well-written, informative brochure on Abrasive Cutting. Details of wet and dry cutting, recommendations for wheel selection and facts on cutting of steel, laboratory specimens, glass, and thin slotting and disk cutting are included, along with data on types of cutting machines.

61. Is Dust A Problem?

Torit Mfg. Co.—No need to say "ah-choo, excust my dust" if your plant is using cabinet or cyclone type dust collectors described in detail in 24-page illustrated catalog No. 36. Sizes range from 1/3 to 5 hp. Also shown are fittings, accessories and blueprints with overall dimensions.

62. Keep Your Plants Warm

Dravo Corp. — "Why They Have Earned Highest Industrial Acceptance" is title of 8-page bulletin 526 on Counterflo direct-fired, warm air heaters. They will heat your foundry, but good. Thirty reasons why they rate high, plus uses and design features are on its pages.

63. Pyrometer Supplies

Minneapolis-Honeywell Regulator Co., Brown Instruments Div.—Loads of useful technical data on application and use of thermocouple pyrometric supplies can be found in 40-page illustrated buyer's guide 100-4. Good March value.

64. Industrial Vision

American Optical Co. — Lowered costs, increased safety and improved production are some of the dividends resulting from the AO Plan for Industrial Safety and Visual Efficiency. Details of this plan for bringing employees' vision up to the highest possible level are presented in 24-page illustrated treatise "Improved Industrial Vision."

65. Aluminum Alloys

Sonken-Galamba Corp. — Besides general information on S-G specification analysis aluminum alloys, this attractive 36-page illustrated brochure offers technical data on 22 types of aluminum alloys. Data includes compositions for sand, and die casting and permanent molding, plus physical data and much dope on brass and bronze alloys. Get this!

66. A Winning Finish

Hammond Machinery Builders, Inc. —Twenty pages jam-packed with useful data on belt and wheel grinding, polishing and buffing machinery as well as dust collectors and cyclones comprise illustrated catalog No. 75, which is yours for the asking. Whatever your finishing problem, there's a size and type of machine to handle it.

67. Hot Stuff!

Whiting Corp. will be glad to send you a copy of the folder "Hot Blast" which shows how Griffin and Todd-Thermo processes of using hot air for combustion results in better melting, closer control and maximum economy. Designated bulletin FO-3, it shows exactly how these systems work. Are you interested in coke savings of up to 33 per cent?

68. Core & Mold Conditioner

Foundry Rubber, Inc.—Paraspray is a waterproof fast-drying liquid for easy application to molds, cores, chills and inserts by spray gun, dipping or brush. How it can be used to produce better castings and lower costs is demonstrated in 4-page bulletin PS 551. Companion bulletin lists advantages obtainable through use of Paracoat for patterns and core boxes and Bonispray for permanent mold die and centrifugal casting.

69. Flux the Matter?

Apex Smelting Co.—Do unsightly pores mar the beauty of your aluminum castings? What they need is a flux that will cleanse them of oxides, sand, plaster and nonmetallic foundry scrap as well as dispel gases that cause pinhole porosity. 8-page bulletin "Apex Flux for Aluminum Alloys" will help you get at the "flux" of the matter.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

70. Plaster Molds

How the Universal Castings Corp. of Chicago produces plaster molds is described in 8-page article "Plaster Molds Give Close Tolerances". Written by Ed Bremer, reprint explains that when close dimensional tolerances in nonferrous castings are required, this process can be applied successfully. The how's, why's and wherefore's are told simply and directly.

71. Good Neighbors

"Community Relations — Management's Responsibility" is a 4-page reprint which relates how the G. H. R. Foundry Div. of the Dayton Malleable Iron Co. wins friends and influences people 'right in their own backyard'. Suggestions for achieving good industry-community relations are tabulated.

72. Get a Move On

"Handling Materials in the Cleaning Department" is one of a series of articles by Bob Herrmann that shows exactly how conveyors, cranes, hoists, overhead conveyors, industrial power trucks and other mechanical materials handling equipment are used to advantage in foundry cleaning rooms. Pictures are of actual installations. There's some practical ideas for you.

73. Pyrometer Pointers

Every operator of nonferrous foundries is concerned with pyrometry. That's why it will pay him to get a copy of "Pyrometry in the Nonferrous Foundry". This 12-page illustrated article discusses various influences of temperature control, types of pyrometers and how to use them.

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6	18	30	42	54	66	78	90	102	114
7	19	31	43	55	67	79	91	103	115
8	20	32	44	56	68	80	92	104	116
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12	24	36	48	60	72	84	96	108	120

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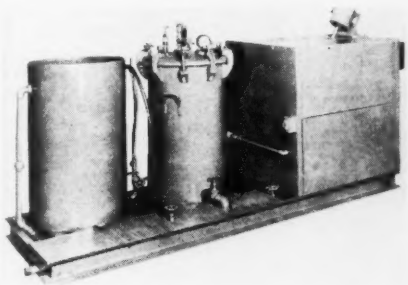
(*Continued from page* 224)

buildings. Standard equipment includes such controls as automatic electric ignition and electronic flame failure protection, "on-off" or "throttling off" type diaphragm valves, constant air-to-gas ratio shutter, ceramic burner face, and centrifugal blower type fan. Pilot operation is completely automatic with electric spark ignition.

For More Details Circle No. 12—Page 225

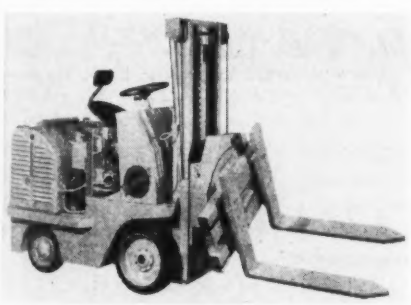
Impregnating Equipment: Metallizing Co. of America, 3520 West Carrol Ave., Chicago 24—New machine is designed for production line impregnating of ferrous and nonfer-



rous castings. Castings to be impregnated need have only minute porosity, fissures or pinholes present. Castings are placed in the unit's sealing tank and subjected to a 29½-in. vacuum to remove air and moisture from their inner walls. Then an impregnating solution is introduced into the vacuum tank, covering the castings. This is followed by application of compressed air at 100 psi, forcing the solution into the casting walls from all directions. When the remaining solution is withdrawn, the castings are removed and rinsed in plain water. It is said that castings sealed by this process have passed tests with hot oil or kerosene under pressures as high as 10,000 psi.

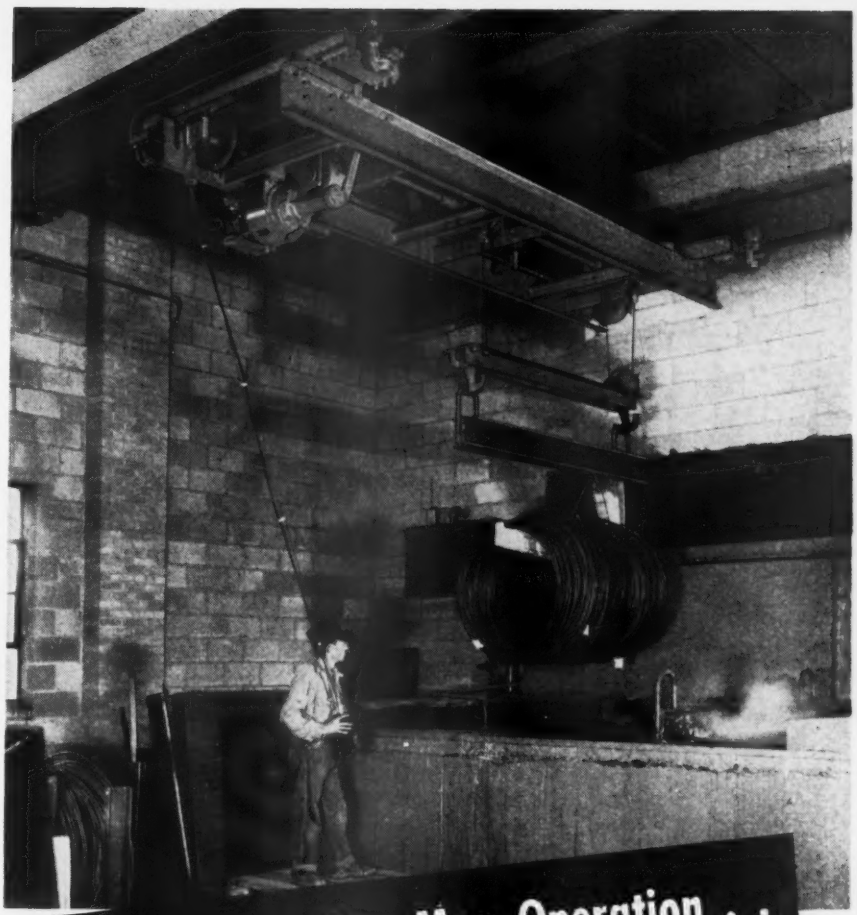
For More Details Circle No. 13—Page 225

Rollover-Clamp: Baker Industrial Truck Division, Baker-Raulang Co., 1250 West 80th St., Cleveland 2—Rollover-clamp attachment for



fork trucks is designed for installation on 4000-lb capacity company fork trucks. The attachment facilitates handling pallet loads of ma-

(*Continued on page* 229)



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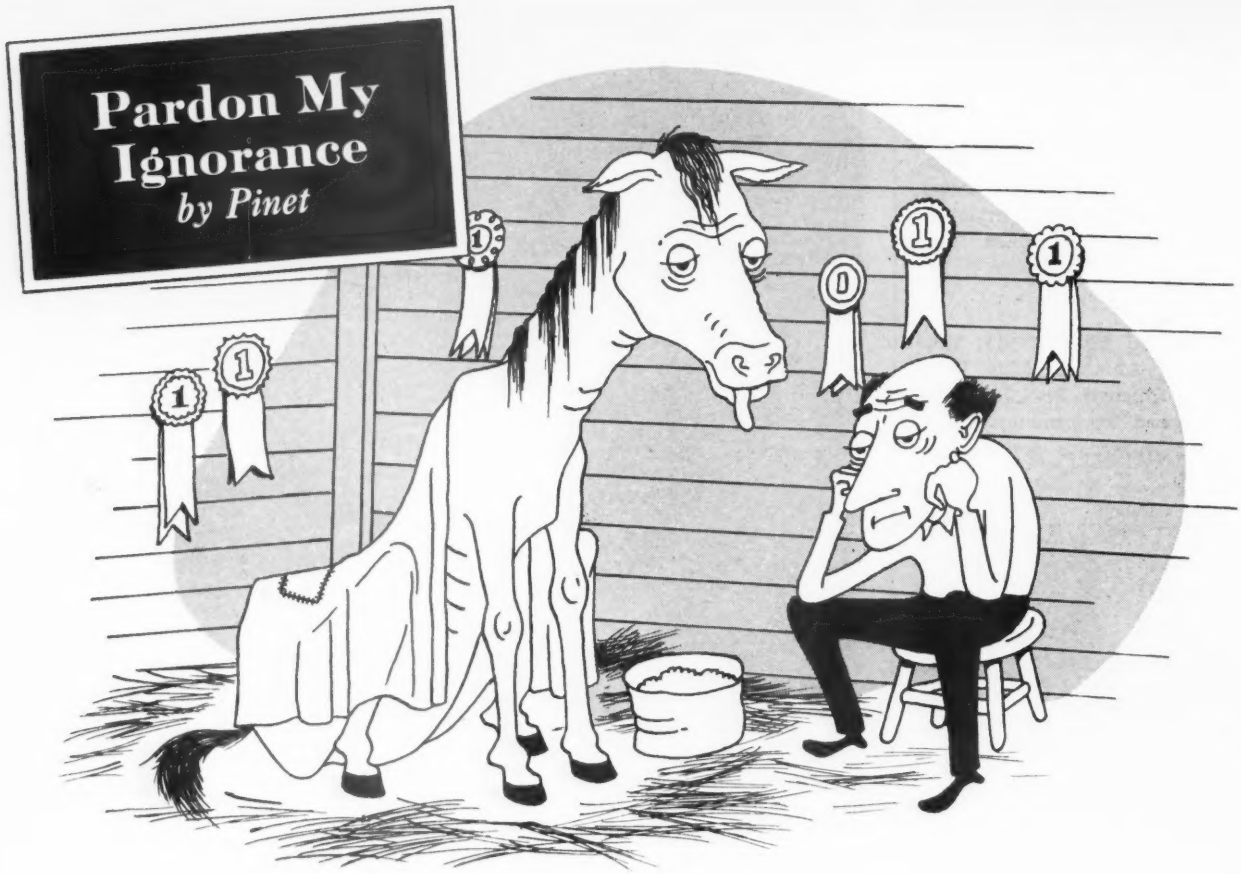

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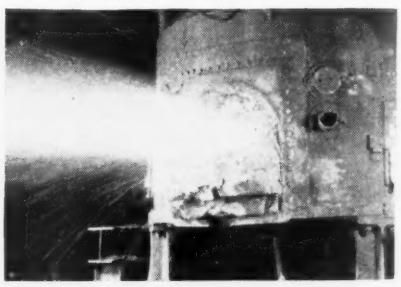
Stabilized Zirconia is the latest and most sensational answer to the demand for refractories that will resist higher and higher temperatures.

Norton *Fused Stabilized Zirconia* crucibles and cement linings are unaffected by operating temperatures up to 4200 F in high frequency induction furnaces. What's more, Zirconia cement linings *are not wet* by many of the metals melted in this type furnace.

By adding *Fused Stabilized Zirconia* to its already well-known ALUNDUM*, CRYSTOLON*, and MAGNORITE refractory cements and shapes, Norton Company is better equipped than ever to engineer special refractories to fit your *exact* requirements.

Why be satisfied with refractories that are just good enough, when you may be able to improve your processes and reduce your operating costs with Norton special refractories? Explain your metal-melting problem to your nearby Norton representative — or write direct to Norton Company, Refractories Division, 300 New Bond St., Worcester 6, Mass. Canadian representative: A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

IN HIGH FREQUENCY INDUCTION FURNACES, particularly for melting platinum and its alloys, Norton FUSED STABILIZED ZIRCONIA crucibles can't be beat. Since they are not wetted by metal, you recover 100% of the melt without destroying the crucible. You can also use the same furnace for different alloys without contamination.



IN BACK-SLAGGING CUPOLAS, slag hole blocks made of Norton CRYSTOLON silicon carbide refractory let you complete your campaigns without stopping for replacement. No softening nor spalling at temperatures up to 3050 F. They resist corrosion, erosion and slag penetration many times longer than fireclay block. Try them and see.

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Special REFRACTORIES

Making better products to make other products better

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(*Continued from page* 227)

terial on the forks, dumping skid boxes with the rotating head, and using the forks as clamps for handling miscellaneous objects. A 4000-lb fork truck equipped with the rollover-clamp will handle loads up to 2400 lb, 48 in. long. These trucks have a telescoping lift to 126 in. and a nested height of 83 in.

For More Details Circle No. 14—Page 225

Dump Trailer: Phillips Mine & Mill Supply Co., 2306 Jane St., Pittsburgh 3—Self-dumping trailer with ½-cu-yd capacity was designed for pulling by hand, lifting and transporting by fork lift truck, and towing singly or in train by industrial tractor. Made of welded heavy gage steel, the trailer has wheels equipped with roller bearings and solid rubber tires. For maneuverability two of the

wheels are castered. Hopper is so balanced that when the safety catch is released the load is emptied, after which the hopper automatically returns to the loading position, re-engaging the safety catch.

For More Details Circle No. 15—Page 225

Transparent Panels: Corrulux Corp., P. O. Box 20026, Houston 25, Tex.—Transparent building panel made of glass fiber reinforced plastic material gives flexural strengths in excess of 15,000 psi, and loading capacities of over 100 psf on a 4-ft span. It is said to transmit from 75 to 90 per cent of the visual light transmitted by air, depending on color. The product is impervious to mildew, humidity, rot, most industrial fumes, and intense heat or cold. It can withstand prolonged exposure to weather and temperature extremes, without cracking, crazing, warping, or discoloring, and never requires protective treatment or refinishing. It is available in corrugated form to match commercially available corrugated roofing and siding sheets of metal or asbestos, and in flat form with commercially smooth finish for skylighting, side lighting, or shatterproof window pane use, as well as for

(*Continued on page* 230)

CRESCENT CHAPLETS

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If you don't see it here .... ask for it!

We manufacture a complete line of all types and sizes of Foundry Chaplets, and all kinds of wire and metal formations for your foundry use. If we don't already make what YOU need, we'll design and develop just the CHAPLET to suit your requirements. Your inquiries and specifications are invited . . . . for quick service, write for working samples. As a few of our specialties:

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SPEED UP production in in *your* blast cleaning room with "Certified" Abrasives. "Certified" Samson Shot and Angular Grit are first choice in hundreds of foundries...give better, longer performance because they're made *extra-tough* by a special *automatically controlled* hardening process. Specify "Certified" and start cleaning more castings per day.

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PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.

STEEL SHOT AND GRIT CO., Boston, Mass.

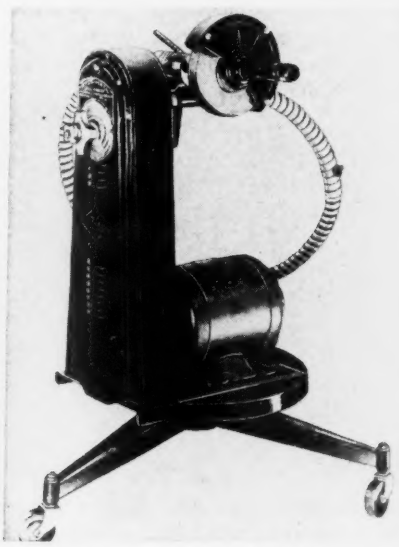
MEMBER FEMA

(*Continued from page* 229)

decorative partitions, ceiling lighting panels, displays, etc. It also comes in a crinkle finish on one or both sides. The panels can be sawed, and anchored to any surface with nails, bolts, or screws.

For More Details Circle No. 16—Page 225

Flexible Shaft Machine: Wyzenbeek & Staff Inc., 223 North California Ave., Chicago 12 — Flexible shaft machine has variable-speed drive which permits speed adjustment by a graduated control dial for all classes of work. Adjustment is infinitely variable, giving a maximum speed ratio of 3 to 1. Motor is placed



low on base of the cabinet to prevent tipping of the machine. Pulleys and V-belt drive are enclosed in a steel cabinet. Machine is offered in ⅓, ½, and ¾-hp and in two speed ranges—1200 to 3600 and 2000 to 6000 rpm.

For More Details Circle No. 17—Page 225

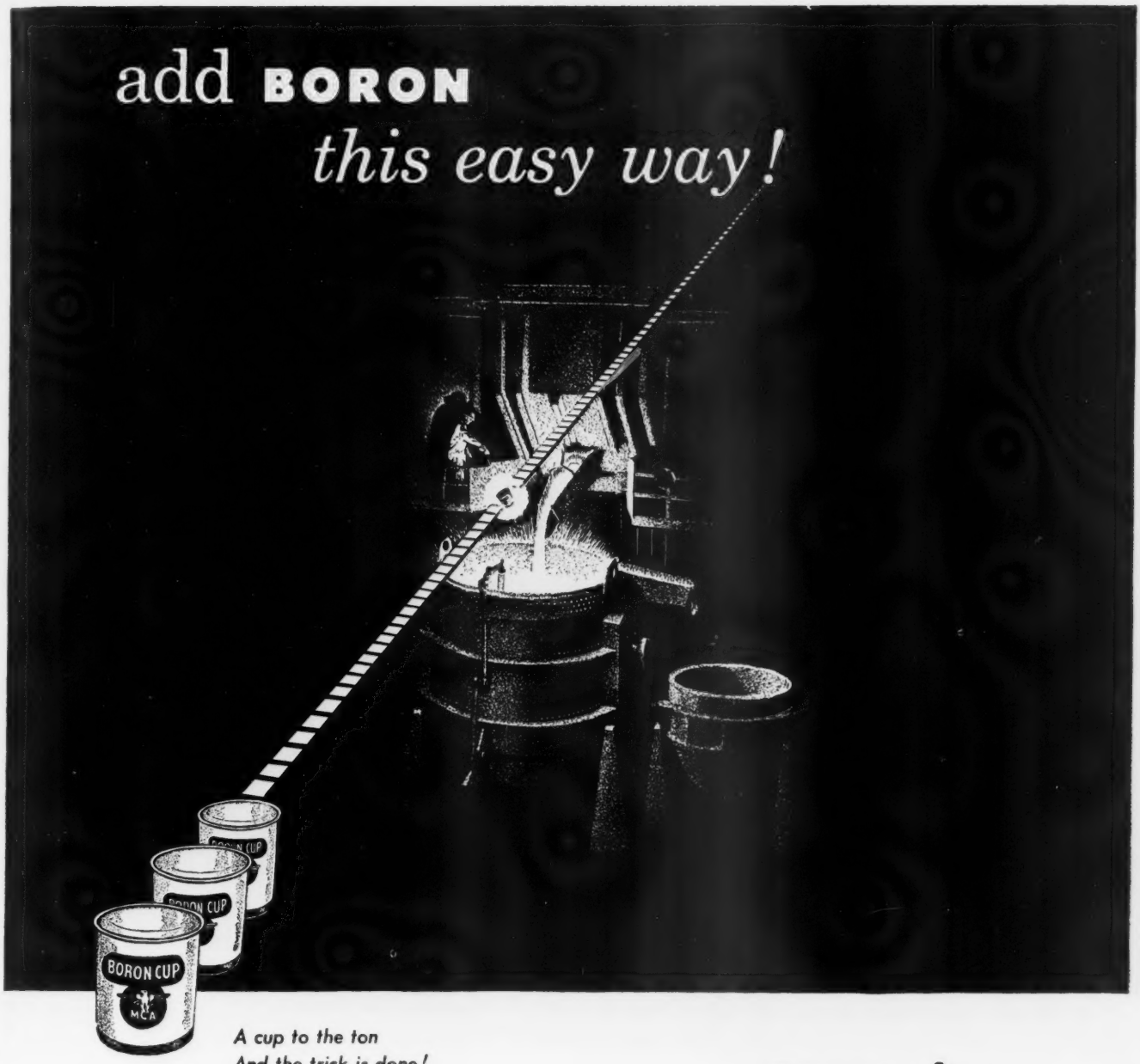
Selenium Rectifiers: Syntron Co., 540 Lexington Ave., Homer City, Pa.—New ac to dc rectifier power conversion units have high current and voltage capacities. These larger cells permit the use of fewer parallel elements for a given direct current output and at the same time keeps weight to a minimum. They are available as individual cells in a wide variety of sizes, or as complete stacks with power rating up to thousands of watts, and are designed for use with vibratory feeders, grizzlies, bin vibrators, and electromagnet hammers.

For More Details Circle No. 18—Page 225

Vises: Columbian Vise & Mfg. Co., 9021 Bessemer Ave., Cleveland 4—Improved line of malleable iron machinists' vises feature a new type graphite-bronze, self-lubricating

(*Continued on page* 233)

add **BORON** *this easy way!*



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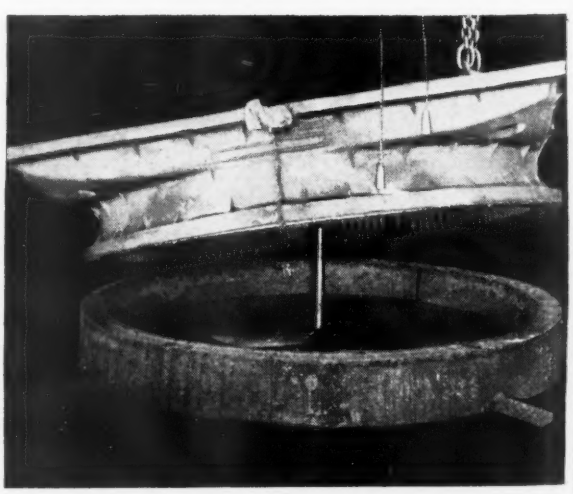
...speeds riser removal
...minimizes grinding
...increases accuracy
...reduces operator fatigue

Cutting risers with an Airco gas cutting machine saves time, greatly decreases grinding and/or machining—and by reducing operator fatigue, it increases and speeds-up production.

Here, for example, is illustrated a simple machine set-up that permits fast, accurate riser cutting. Using an Airco Radiagraph, the casting — measuring 105″ in diameter and 5″ in thickness — is trimmed at a speed of 5″ per minute. More important, the Radiagraph cuts so close to final machining specifications that slow expensive machine work or grinding is eliminated, and a costly production bottleneck is done away with.

This actual case history demonstrates the advantages of removing gates and risers by machine gas cutting. Airco gas cutting machines are easily adaptable to any cutting requirements — straight line, circle, or bevel-edge cuts.

If you would like further details on how machine gas cutting, as well as other Airco oxyacetylene processes can save time and money for your foundry operation, call or write your nearest Airco office — today.



Top photograph shows the simple set-up that makes easy work of a tough job. Above you see the clean, accurate cut, ready for machining.

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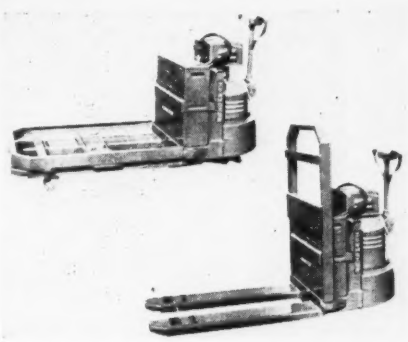
(*Continued from page* 230)

thrust bearing at the front of the sliding jaw. It is said to absorb thrust of the steel screw head, provide easy and positive operation, prevent wear, and eliminate end play. Steel ball handle ends forged from the handle stock itself are another feature. Vises are made in all standard sizes—3 to 8-in. jaw widths. Replaceable hardened tool steel jaw faces of "T" section design are pinned into the castings so they cannot come loose in use.

For More Details Circle No. 19—Page 225

Pallet Truck Adapter: Towmotor Corp., 1226 East 152nd St., Cleveland 10— Adapter converts the company's electric pallet truck into a platform truck, and makes possible the handling of platforms, skids, and tote boxes. Of steel framework construction the adapter adds extra



height to the forks of the pallet truck. When not in use, it folds up over the battery and latches securely. The open frame construction permits full visibility for the operator. Height of the forks with adapter is 7 in. in the lowered position, 11 in. raised. It is available in lengths to match standard pallet truck forks up to 72 in. long.

For More Details Circle No. 20—Page 225

Paint: Monroe Co., 10703 Quebec Ave., Cleveland 6—Antirust paint is formulated for application over rust without wire brushing, scraping or sandblasting. Available in black, aluminum and clear, the paint is suitable for interior and exterior use on either old or new metal. Upon application, it is said to penetrate through any existent rust layer and seal the surface against further rust action. It is compounded for brush application and may be thinned for spraying.

For More Details Circle No. 21—Page 225

Clamping Fixture: Miller Motor Co., 4027 North Kedzie Ave., Chicago 18—Designed and built by Planet Products Corp., Cincinnati, a new milling machine clamping fixture operates at 80 psi air input, exerting

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MOTOR—Designed for **CLARK** for the specific power requirements of industrial use. Fuses protect both motor and circuits against damage.

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DRIVE AXLE BY CLARK—Regular Hiway-Truck-Type Clark axle—the best that can be said of any axle.

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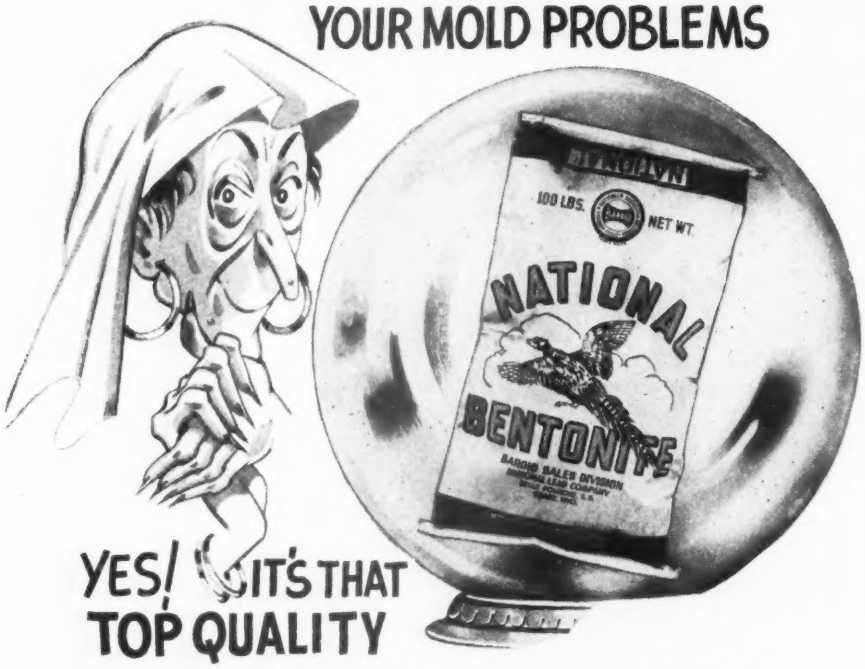
I THINK I SEE THE ANSWER TO YOUR MOLD PROBLEMS



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NATIONAL BENTONITE

No, National Bentonite isn't a cure-all for mold troubles, but it does help with many of them. Because National Bentonite helps make molds with low moisture content, it cuts down the dangers of gas holes and blows. National Bentonite-bonded molds have both high green strength and good hot strength—produce finer-finish castings, too. That means better castings, fewer rejects. And isn't that what all good foundry men want?

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McConnellsville, New York

Lloyd N. Canfield Foundry Supplies
Kansas City, Kans.

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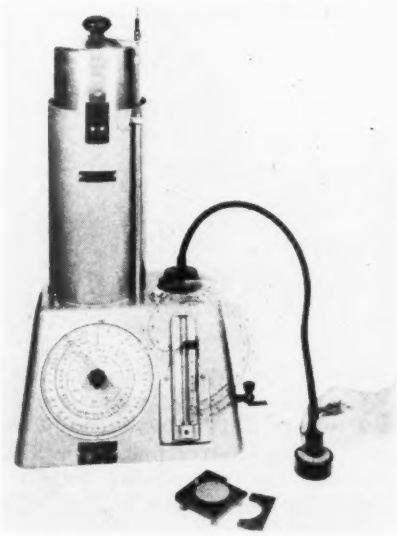
a hydraulic pressure of 2000 psi to provide a total clamping force of 10,000 lb without the use of hydraulic pump or high pressure valves. By varying the air pressure input, higher or lower hydraulic clamping pressures may be obtained. In operation, compressed air enters the oil tank, driving the oil through the booster by-pass and directly into the hydraulic cylinder so that its piston rod extends with low pressure to contact the work. As soon as the rod contacts the work, the high pressure oil from the booster "cuts in" automatically to provide the high clamping pressure for holding the work.

For More Details Circle No. 22—Page 225

Shell Mold Tester: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Permeability of shell molds can vary over a wide range with different sands, resin contents and flow



characteristics. To assist in determining this permeability, a shell mold permeability accessory has been developed to be used in conjunction with a permeability meter or permmeter. It is designed to read AFS permeability on a ¼-in.-thick disk. Comparative permeability measurements also may be made on the mold itself.

For More Details Circle No. 23—Page 225

Fire Extinguisher: General Pacific Corp., 1501 East Washington Blvd., Los Angeles 21, or General Detroit Corp., 2272 East Jefferson Ave., Detroit 7—One-quart fire extinguisher is said to remain free from corrosion through use of a corrosion arrestor, which is a part of the pump, and purifies the liquid. The vapoliquid fire extinguisher is designed for use in fighting gasoline, oil and electrical fires. It carries underwriters' rating B-2, C-2.

For More Details Circle No. 24—Page 225

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X-RAY DIFFRACTION UNIT

150 KV MOBILE X-RAY UNIT

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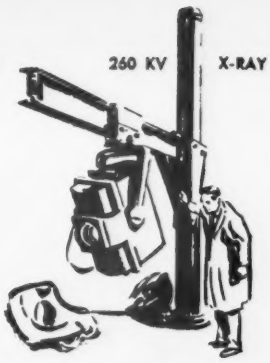
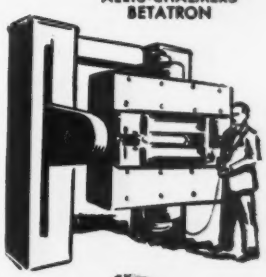


22,000,000 VOLT ALLIS-CHALMERS BETATRON



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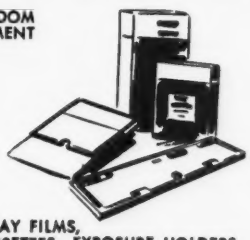
DARKROOM EQUIPMENT



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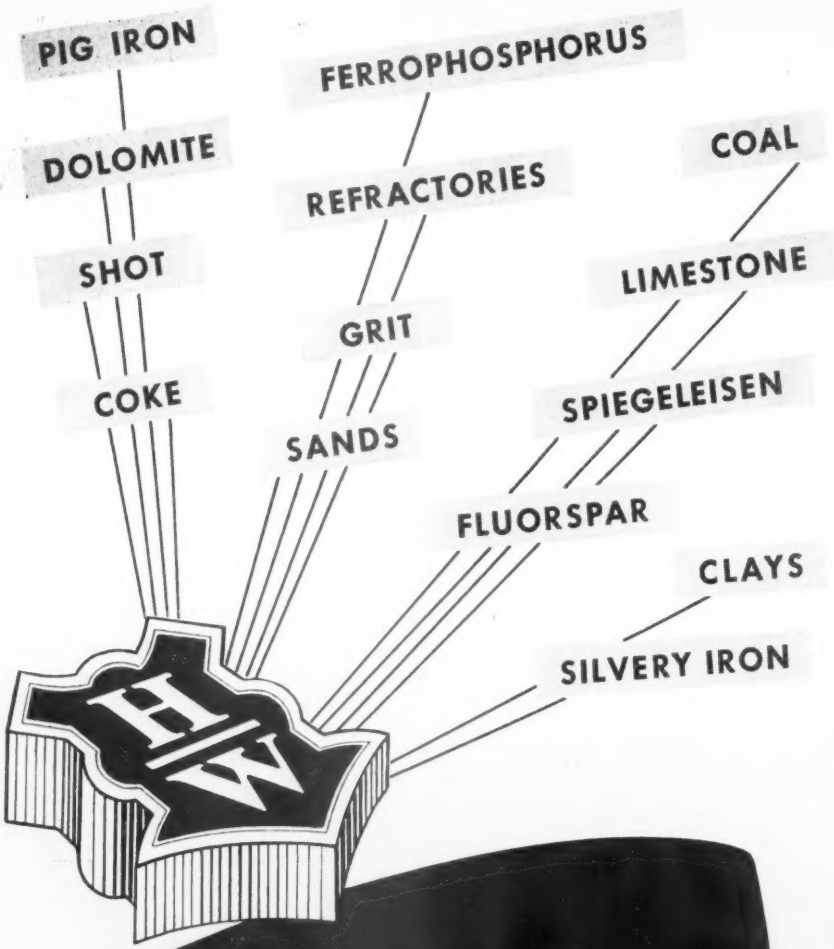

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British Committee Issues Report on Productivity

THE first productivity team to visit the United States from Great Britain under the auspices of the Anglo-American Council on productivity came from the steel founding industry. The visit was made early in 1949 and the team's report and recommendations were published in September of the same year. A productivity committee also was formed by the British Steel Founders' Association, and this committee recently issued a report entitled "Progress in Productivity," reviewing the progress made by the steel founding industry in putting into practice the recommendations contained in the team's report.

Over half the association's members, representing well over half the industry's total tonnage, contributed to this report, which is divided up under six headings: Sales, Design, Layout, Equipment, Methods and Research, and Personal Relations.

Sales Policy — Several firms, although not a sufficient number to justify a broad generalization being made, reported they are using sales policy to employ machines in place of unobtainable skilled workers, to reduce the variety of steel compositions, and to obtain long production runs.

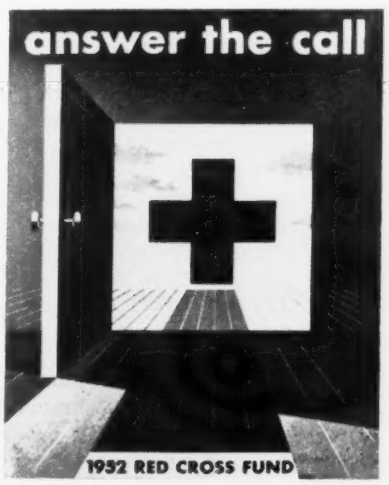
Design—Replies showed that this is linked up with sales activities, and emphasized how important it is that founder and customer understand each other's ideas and difficulties. Close co-operation between the two often leading to changes in design. Standardization is being increasingly emphasized, and some sections of the BSFA have succeeded in standardizing certain castings, while one founder, by offering good deliveries for standard patterns but poor deliveries for frivolous modifications, has succeeded in having standardized designs accepted. Finally, one foundry associated with an engineering works has established one section working full-time on problems of standardization.

Layout—A large number of important changes have taken place, ranging from one or two firms which have installed a new melting shop or new bays, to a general emphasis on better mechanized molding, whether by molding machines or sand-slingers, and on improved efficiency and conditions in cleaning departments. Some foundries have eliminated much loss of time by reorganizing their pattern shops and improving their production control, and one has cut down the movement of

castings by centralizing heat treatment, burning-off and shot blasting processes.

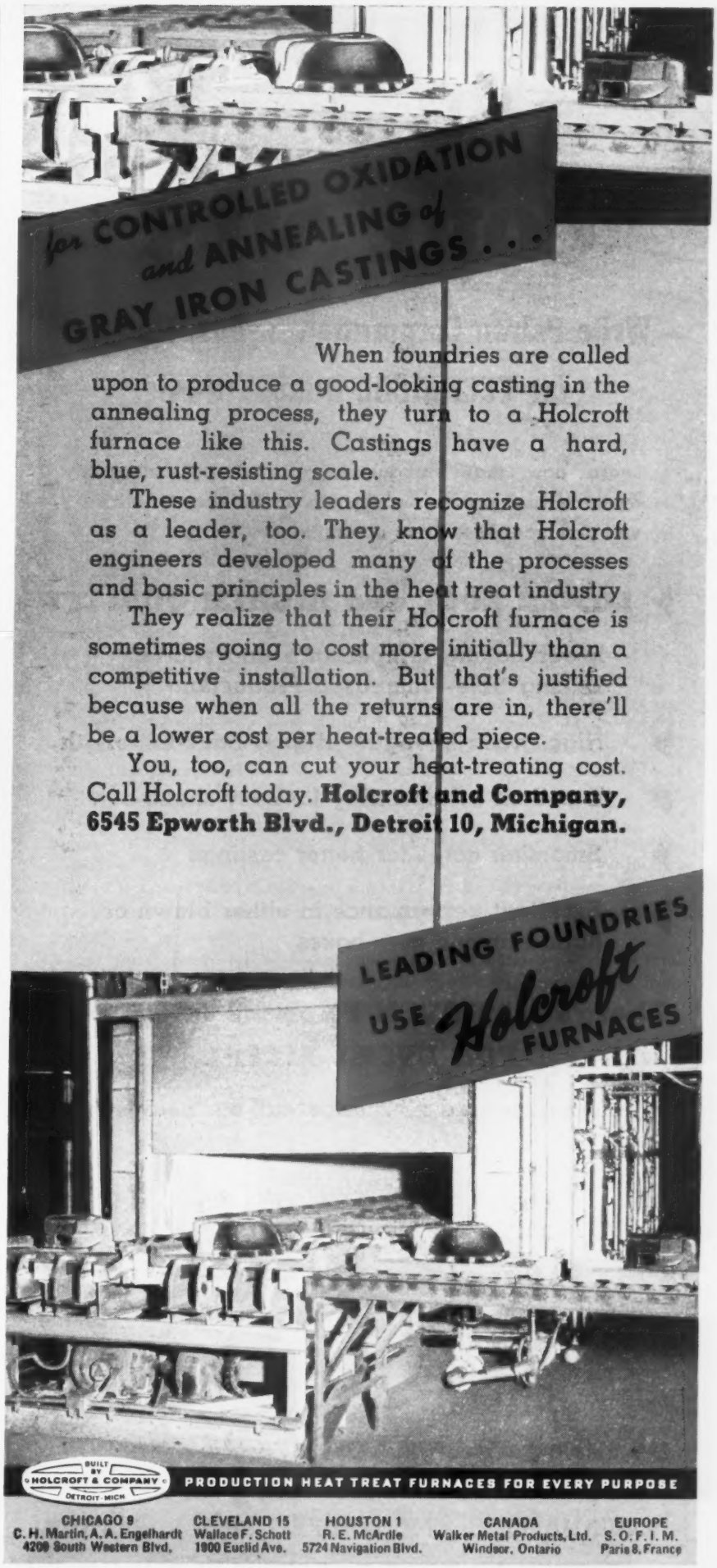
Equipment — Nearly all foundries mention the installation of new equipment or the better use of existing plant over the last three years, despite the fact that many had already carried out extensive improvement and modernization. The reports provide evidence that where equipment is already satisfactory, improvements in productivity have still been possible. One founder reported that he had improved productivity (measured in man-hours per ton) by 14 per cent on his sandslinger, 47 per cent on machine molding and 50 per cent on cleaning castings. One founder has doubled production since he introduced machine molding.

In the core rooms, more core blowers are in successful use, new core ovens are reported, and the use of light alloys for core plates and driers. Several reports from BSFA members mentioned mechanical knockouts, flame-cutting machines, airless shotblast, and the use of crane magnets, and real efforts are being made to tackle the dust problem.



Of all the steel founding processes, steel melting has been the least affected by the prevalent re-equipment trends. This may be due to the shortage of electric power, which makes the installation of electric arc furnaces impracticable. Also, the scarcity of scrap has prevented a general turnover from basic to acid melting, though two foundries reported that they had done so.

Methods and Research—Reported methods to speed operations include the use of acid arc melting combined with carbometer testing and oxygen blow, and this has reduced melting time by about 40 per cent from tap to tap. Pattern changes have been speeded up to put short runs on machines, and split and mounted pat-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terns are coming into greater use even for hand molding. Many reports showed that knock-off cores for quick removal of heads are being extensively used. One founder has reduced his grinding costs by 40 per cent through close study of grinding wheel usage. Increasing attention is also being directed to sand formulation to obtain better strip and consequent cleaning economy. Green sand work is increasing, with introduction of unit sand, and several foundries are reaping benefits from the use of finer grain sands. Economies are being sought in the use of exothermic feeding powders. Two members have sent technicians to the United States, and one is using an American foundryman as consultant for a specific job.

Personal Relations—Reports have been sent in of improved working conditions throughout the industry, of schemes for apprentices, older entrants, and supervisory staff, and publicity on the shop floor through the publication of productivity statistics and shop achievements.

It is of interest to note that, while the price of steel castings has increased an average of 83 per cent since 1939, average wages in the industry rose 134 per cent in the same interval. It has been estimated that the overall increase of productivity in the industry in the past three years is somewhere between 15 and 20 per cent. It is felt that much more could be achieved, but the main difficulties the industry has to contend with are in obtaining new machines and equipment, owing to shortages, and resistance on the part of workers' unions to modify some of their established methods and to adopt new ones.

Book Review

Production Processes, Their Influence on Design, Vol. II, by Roger W. Bolz, cloth, 387 pages, 6½ x 10¼ in., published by the Penton Publishing Co., Cleveland. Price, $7.50.

Foundrymen will be especially interested in this voume, since approximately one-third of the text is devoted to designing for manufacture by six casting methods. Types of molding discussed include sand, centrifugal, permanent mold, die, plaster and investment.

A wide variety of design considerations, including shrinkage allowance, draft, parting lines, coring, section uniformity, corners and fillets, bosses and lugs, ribs, holes and inserts are considered. Data also are provided on basic design properties and applications of cast steel; principal characteristics and uses of alu-

minum alloys; copper-base sand casting alloys; magnesium sand casting alloys; die casting alloys; and plaster-mold casting alloys.

Other sections of the book deal with powder metallurgy; plastics, rubber and ceramics molding; welding, brazing, heat treatment and shot peening. Excellent illustrations add considerably to the text.

Health in Foundries Is Conference Topic

A conference on health protection in foundry practice has been arranged by the School of Public Health, University of Michigan, Ann Arbor, Mich., to be held Apr. 11-12 in the School of Public Health Building.

Sessions on Friday will be of general interest to all branches of the foundry industry whereas those on Saturday will divide the group into ferrous and nonferrous branches. The final session Saturday afternoon will be a general summary and feature a presentation by Kenneth Morse of the recently introduced Safety, Hygiene and Air Pollution program being sponsored by the American Foundrymen's Society.

Two events scheduled for Friday evening will be held simultaneously in the East Engineering Building. Part of the group will attend demonstrations in the university's foundry while others are viewing movies, some specially made for this conference.

Friday, Apr. 11

First General Session: James A. Purdy, presiding.

9 a.m.-12:15 p.m. Introduction, Dr. Henry F. Vaughan; keynote address, A. C. Hensel; "Nature of Disease Caused by Dust," Dr. O. A. Sander; "Measurement of Dust in Foundries," Donald Van Farowe.

Second General Session: Paul W. Olson, presiding.

1:30-5 p.m. "Housekeeping," H. J. Weber; "Isolation, Substitution and Wetting Agents," Edward Meiter; "Respirators," A. Kamaila; "Ventilation," William N. Witheridge.

7:30 p.m. Demonstrations in the foundry, University of Michigan; movies.

Saturday, Apr. 12

Problems of Ferrous Foundry Practice: R. A. Flinn, presiding.

8:30 a.m.-12:15 p.m. "Sand Handling," Claude B. Schneible; "Coremaking and Molding," George Tubish; "Melting and Pouring," John Radcliffe; "Shakeout and Core Knockout," John Kane.

1:30-3:30 p.m. "Casting Cleaning," W. W. Dodge; "Casting Grinding," Kenneth Robinson.

Problems of Nonferrous Foundry Practice: Frank Patty, presiding.

8:30 a.m.-12:15 p.m. Introduction, A. Burns; "Nature, Manifestations and Medical Management of: Lead Poisoning; Metal Fume Fever," Dr. L. E. Hamlin; "Measurement of Lead and Zinc Exposures: In Air; Blood in Urine; Porforines in Urine," Dr. William G. Frederick; "Control of Metal Melting and Pouring Operations," George Hama.

1:30-3:30 p.m. "Control of Dust Exposures," Bernard Bloomfield; An overall view of any exposures that can occur, such as cadmium, beryllium, gases, heat, housekeeping, etc. Motion pictures, as time permits, for illustration, by Dr. Carey P. McCord.

Combined Final General Session: John Soet, presiding.

4-5 p.m. Summary and conclusions, W. G. Ferrell; presentation of AFS 10-year program in safety, hygiene and air pollution, Kenneth Morse.

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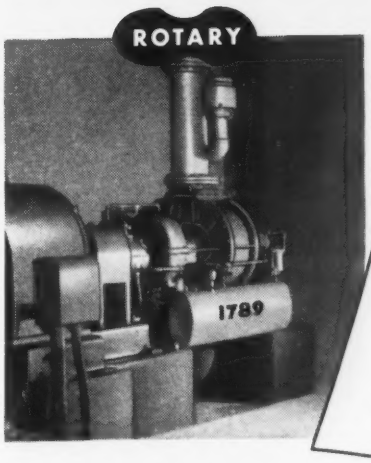

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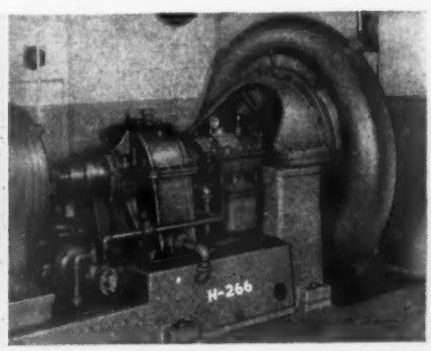

Reg. U. S. Pat. Off.

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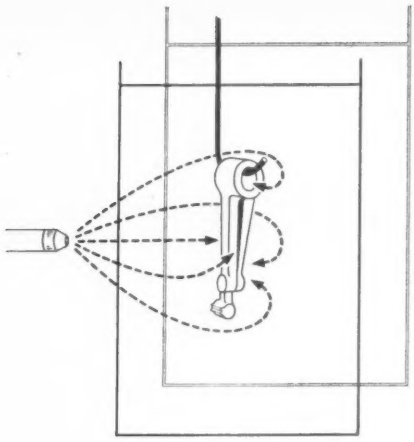
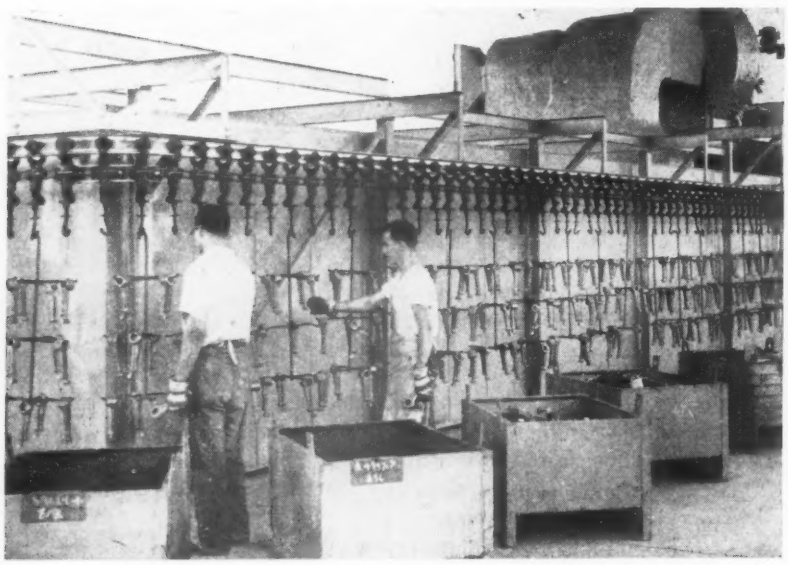
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

Painting Castings Electrostatically

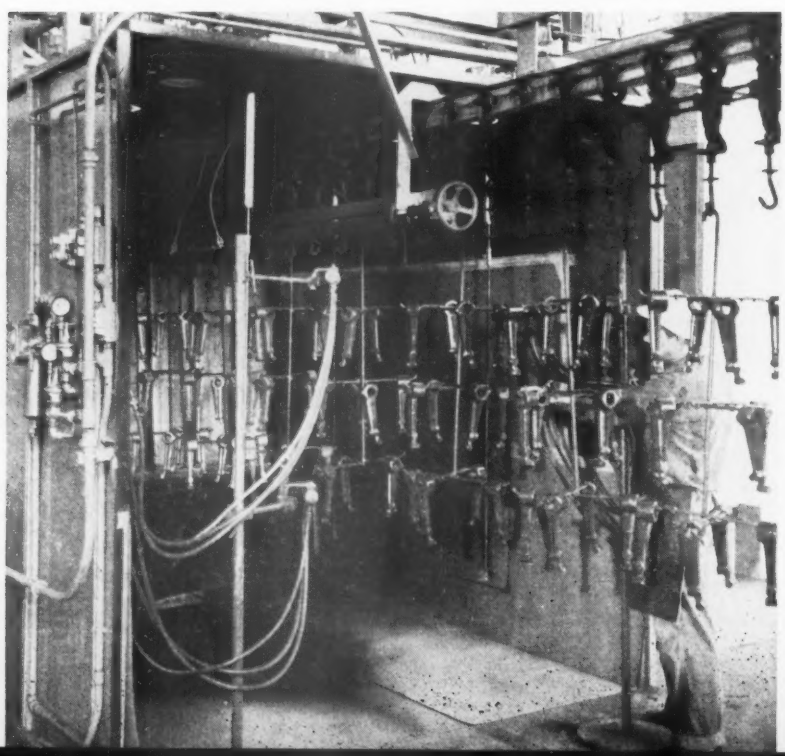


Atomized paint from nozzle at left is attracted to all casting surfaces by compelling forces of the electrostatic field surrounding the casting



Conveyor-mounted workholders are loaded with needle bar lifting arm castings for transportation through the paint spray booth and the baking oven, which is the long structure supporting the conveyor

Castings enter the spray booth from the left and are painted, as they move and rotate in the electrostatic field, by four spray guns



MOST of the castings for knitting and braiding machine parts produced by Textile Machine Works, Foundry Division, Wyomissing, Pa., with the exception of the extremely large and most minute, are painted electrostatically. Painting of the castings is automatic. No spray gun operators are necessary; only the attention of one operator is required for occasional adjustment of the painting equipment, regardless of production volume.

The principle of electrostatic painting is a basic physics fundamental—opposites attract each other while likes repel. Put into practice this principle makes spray particles, atomized from spray guns at the entrance to the spray booth, go directly to the object at which they are aimed.

Castings to be painted are supported on workholders carried by an overhead chain conveyor through the spray booth. In the booth, an electrode of fine wires is mounted on each side of the conveyor. These electrodes are charged to a high potential so that an electrostatic field is created between the electrodes and the grounded castings.

Automatic spray guns also are located on each side of the conveyor and spray paint into the electrostatic field created by the electrodes, in a direction roughly parallel to the path of travel of the castings. The paint particles receive a negative charge and are attracted to the opposite polarity—the line of grounded castings.

Attraction in the spraying zone is so great that some of the paint particles reverse their direction, turning as much as 180 degrees, thus painting more than the facing surface of the castings. This feature of electrostatic painting makes possible painting edges and other areas difficult to cover with hand spraying methods. However, as the castings pass through the spraying zone, they rotate slowly on the workholders, assuring complete paint coverage.

It is said that very little paint is wasted because almost every particle reaches the castings. A water curtain on one wall of the spray booth, picks up the minimum overspray not deposited on the castings and also washes exhaust air to prevent accumulation of paint deposits. The spray booth is equipped with an exhaust system which is adjustable to permit creating favorable condi-

(*Concluded on page* 242)

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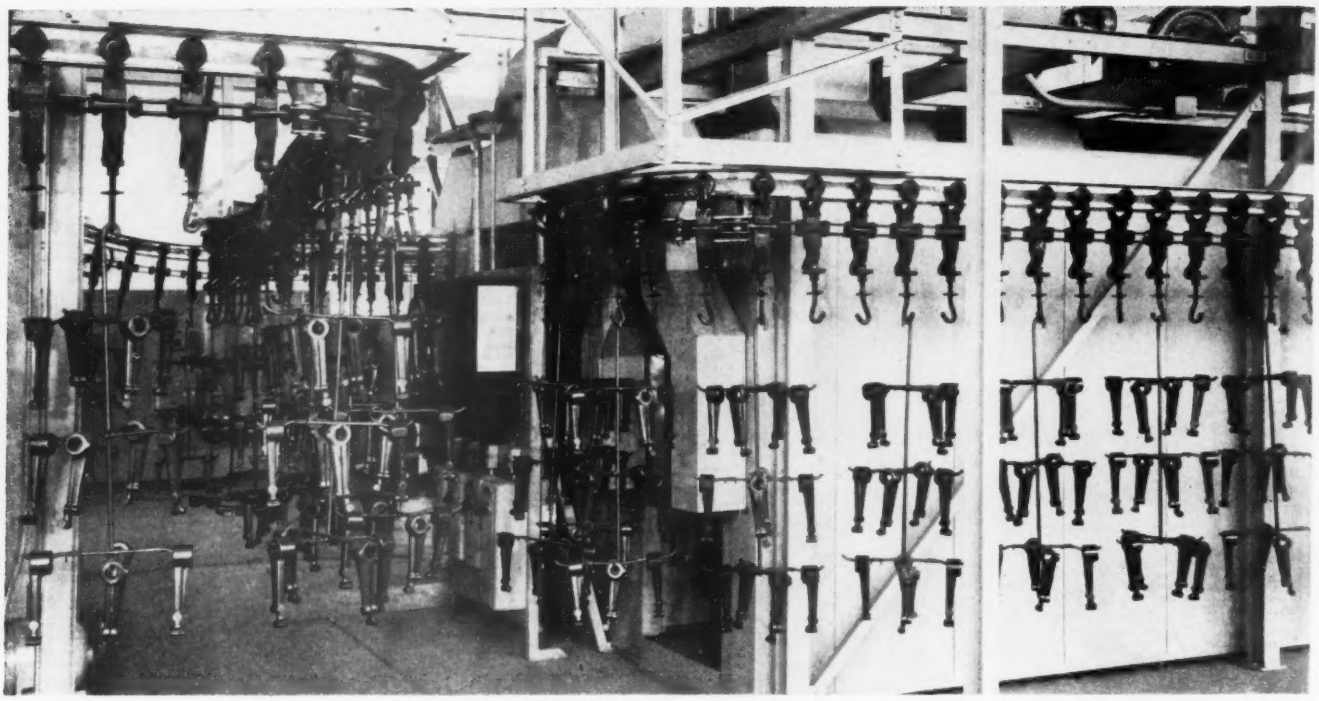

Painted castings at left are entering the oven and emerging at right to cool and be unloaded as conveyor moves toward the loading point

(*Concluded from page* 240)

tions of air velocity for electrostatic painting.

Just beyond the spray booth the conveyor makes a U-turn and enters a 54-ft oven where the painted castings are baked. Air in the oven is gas heated, recirculated, filtered and automatically maintained at an average temperature of about 400°F. The conveyor is looped in the oven so that the baking cycle of approximately 20 minutes is consumed in a relatively small area. From the baking oven, the conveyor passes through a cooling and unloading area, continuing on to the loading point to resume the cycle.

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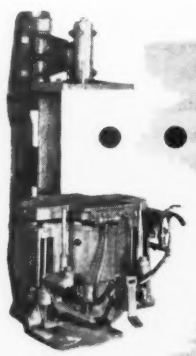

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517 SI

Nodular Graphite in Iron

(*Continued from page* 111)

than in a plane (Fig. 4 C and D). The nodules in the chill-cast bar were smaller and more numerous than those in the sand-cast bar. This indicates that, under their respective cooling conditions, either the sand-cast bar contained a smaller number of graphite-crystallization centers, or the nodules in the sand-cast bar were able to coalesce while the nodules in the chill-cast bar could not.

The occurrence of nodules in strings or chains observed in the microradiographs, but not in the photomicrographs of the sand cast bar, may be the effect of projecting nodules in a three-dimensional section onto a plane and hence more appar-

TABLE V—Heats Treated with 80 Cu—20 Mg Alloy. Maximum Heating Temperature 1500°C. Pouring Temperature 1340°C.

Heat No.	Iron designation	Mg Added %	Chemical Composition (% by Weight) C	Si	Mn	P	S	Mg	Cu	Carbon Equivalent[1]	1.2-in. Diam. Sand-Cast Bar Bhn	Structure
244B	E	0.50	3.66	2.63	0.53	0.030	0.022	0.024	...	4.46	131	Flake graphite. Mostly ferrite, some pearlite.
246	E	0.50	2.77	2.89	0.56	0.072	0.013	0.092	...	3.66	245	Nodular, nodules in ferrite rings.
255	I	0.50	3.64	2.73	0.26	0.12	0.009	0.10	1.3	4.50	273	Almost 100% nodular, most nodules round and compact, many in ferrite rings or areas. Matrix: pearlite with some free ferrite.
256	I	0.4	3.65	2.87	0.36	0.14	0.008	0.10	1.3	4.55	250	Nodular, nodules in ferrite rings. Matrix: pearlite, small amount of free cementite.
257	I	0.3	3.32	2.84	0.42	0.15	0.009	0.058	0.88	4.22	186	Nodular nodules in ferrite rings, many irregular in shape. Matrix: ferrite and pearlite.
269	I	0.3	3.18	2.65	0.47	0.12	0.009	0.042	0.98	4.01	...	Nodular, nodules mostly in ferrite rings, some in pearlite, many irregular in shape. Matrix: ferrite and pearlite.
290	I	0.5	3.15	3.18	0.46	0.15	0.005	0.052	0.76	4.15	216	Ditto.
306	I	0.5	3.01	3.01	0.47	0.13	0.005	0.12	1.6	3.95	273	Sand-cast bar: nodular, nodules in ferrite rings. Free ferrite and pearlite, some free cementite.
307	I	0.7	3.49	2.94	0.79	0.12	0.004	0.15	2.0	4.41	422	Sand-cast bar: nodular, nodules in pearlite. Matrix: pearlite and cementite.
308	I	0.6	3.16	2.87	0.47	0.14	0.006	0.10	1.8	4.06	263	Sand-cast bar: nodular, most nodules in ferrite rings, some in pearlite. Matrix: ferrite and pearlite, some free cementite.

1. Carbon equivalent was calculated by formula: % C + 0.3 (% Si + % P)

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ent than real. There was a tendency for radial nodules to form as the cooling rate increased. Surveys of the microstructure of the wedges cast from heats in this group confirmed the previous observation that faster cooling favors nodular formation. This is illustrated in Fig. 5, where the percentage of nodules decreases from the tip toward the base of the wedge.

Effect of Pouring Temperature — The third group of heats (Nos. 275 through 279 inclusive, Table III) was made to study the effect of pouring temperature on the graphite structure and transverse strength properties of sand-cast bars. All heats were made of stock iron No. 1 in a plain clay-graphite crucible. The maximum heating temperature was 1500°C and the pouring temperatures ranged from 1310° to 1370°C. Magnesium equal to 0.3 per cent of the charge was added to each heat in the form of 80 Cu-20 Mg alloy and either two or four standard transverse bars were cast in dry sand molds. The properties obtained are given in Table IV. Results on the bars of two heats poured at 1360°C are omitted as these bars were defective.

As far as can be judged from such a limited number of tests the pouring temperature has little effect on the transverse strength properties.

The graphite structure of these heats was 100 per cent nodular. The nodules were mostly of the radial and regular compact types but there were also some nodules of the patch type which exhibited a spongy-like structure, some of these showing large round white cores in their centers.

The results obtained in this series of heats show some inconsistencies for which there is no obvious explanation.

In the first group none of the sand-cast bars containing less than 0.1 per cent magnesium had 100 per cent nodular structure whereas this structure was observed in all bars of the second and third groups containing magnesium in amounts ranging from 0.044 to 0.098 per cent.

The silicon contents and carbon equivalents of group 1 were somewhat less than those of groups 2 and 3 but the difference does not seem sufficient to cause the difference in structure observed.

The first group was melted in clay-graphite crucibles lined with sillimanite, the second group in crucibles coated with silica wash, while the third group was melted in plain crucibles. Some results obtained at the beginning of this investigation with

melts made in magnesia and clay-graphite crucibles seemed to indicate that the crucible lining could nullify the effect of the magnesium treatment but results with subsequent heats melted in magnesia and plain clay-graphite crucibles failed to confirm the earlier results. There is no reason to believe that the sillimanite lining ($Al_2O_3SiO_2$) could nullify the magnesium treatment, particularly as no such effect was observed with crucibles coated with a silica wash.

The melting and casting conditions of heats 240 and 279 (Table III) were about the same, the chemical analyses, except for carbon (carbon equivalent 4.09 and 4.54), were practically the same, including the magnesium content, 0.094 per cent. Both irons were nodular but there was considerable difference in the hardnesses (brinell of 269 and 370, respectively) and microstructures of the matrix of the sand cast bars prepared from these heats.

Effect of Variations in Stock Metal —Table V presents the data for some selected heats of stock irons E and I treated with different amounts of magnesium added in the form of 80 Cu-20 Mg alloy. Heats Nos. 244 B and 246 were made in clay-graphite crucibles coated with a silica wash, the remaining heats being made in plain clay-graphite crucibles. For all heats, the maximum heating and the pouring temperatures were 1500° and 1340°C, respectively.

There was considerable variation in the quantity of magnesium retained by the melt. For example, the same quantity of magnesium, 0.5 per cent, was added to heats No. 244 B and No. 246 and the melting conditions were the same, yet the magnesium contents were 0.024 and 0.092 per cent, respectively. It is probable that non-uniformity of the copper-magnesium was one of the causes of this difference, although variation in the quantity of magnesium oxidized during the operation may have been a contributing factor.

Despite the fact that hypoeutectic, eutectic and hypereutectic irons are included in the group with carbon equivalent values of 3.66 to 4.55 and magnesium contents of 0.024 to 0.15 per cent, the graphite structures of the sand-cast bars were all 100 per cent nodular except one, No. 244 B with 0.024 per cent magnesium. For magnesium contents in the neighborhood of 0.050 per cent, most nodules were of irregular shape, while in irons containing larger amounts of magnesium most nodules were round and compact.

Irons containing 0.042 to 0.092 per cent magnesium show structures con-

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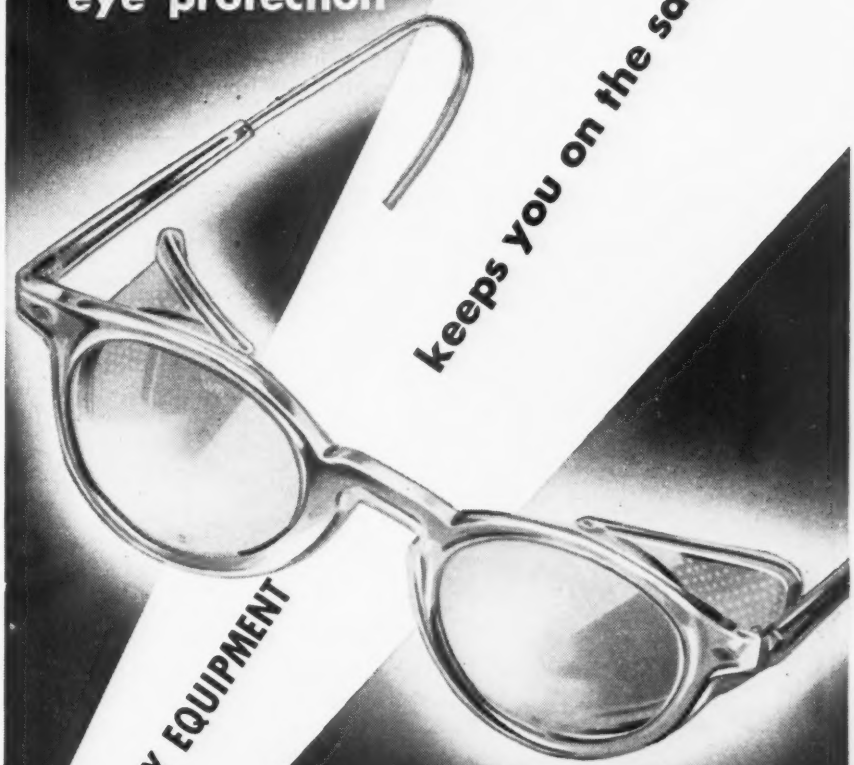

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sisting of pearlite, ferrite, and graphite nodules, some nodules being surrounded by ferrite rings, others being located in pearlite. The tensile properties determined for the irons possessing this structure were approximately as follows: Ultimate strength 75,000 psi, elongation 5.3 per cent in 2 in. and reduction of area 2.3 per cent. The iron containing 0.024 per cent magnesium exhibited a regular flake graphite structure. No free cementite was observed in heats containing less than 0.10 per cent magnesium. A large amount of massive cementite was present in the bar containing 0.15 per cent magnesium and 2 per cent copper (heat 307); correspondingly, its brinell hardness was high, 422.

Microscopic examination of different sections of the wedge blocks indicated that in the heats containing 0.1 per cent or more magnesium the 100 per cent nodular structure persisted even in the sections located at considerable distances (about 9 in.) from the tip. Apparently, the formation of nodular graphite in magnesium-treated cast iron is relatively insensitive to the cooling rate when the magnesium content is sufficiently high.

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Book Review

Manufacturing Processes, by Myron L. Begeman, professor of Mechanical Engineering, University of Texas; cloth, 608 pages 6 x 9 in.; published by John Wiley & Sons Inc., 440 Fourth Ave., New York 16; may be ordered through Penton Publishing Co., Cleveland; $6.

In this third edition written primarily for students and professionals engaged in production, industrial or tool engineering work, each chapter concludes with a list of review questions and a list of references to authors and quotations in the text.

The first half of the book is devoted to foundry practice, patterns, plastic molding, powder metallurgy, hot and cold working of metals, heat treating and welding. The second half covers measuring instruments, cutting tools, machines and their accessories.

This edition has been completely revised to include machines, processes and machine tools developed recently. The chapters on special casting methods, welding and allied processes, cold forming of metals and plastic molding have been completely rewritten. New material includes sections on continuous casting of metal, marforming, hydrodynamic forming, plastic molds, cold and stud welding, multistation transfer machines, jigs and fixtures and many recent automatic and semiautomatic production machines.

In all cases the information is fundamental in character, describing the machine or process as well as discussing its range of application and limitations.

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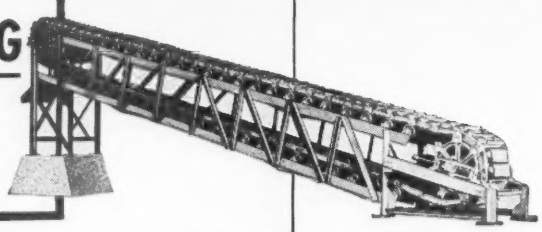

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Limited Mechanization

(*Continued from page 95*)

vidual mechanized unit which now serves this team. Production demands for sand were met by rebuilding one of the old mixers and using this to supply all molding sand to the molders. No separate facing sand is used. Although the mixer was over 27 years old, good maintenance and slight modernization made it entirely suitable for its intended purpose. Two types of sand are produced, each having maximum physical values and flowability to produce quality castings.

While a pin-lift and rollover machine are used, these can be replaced by either straight pin-lifts or squeezers should the occasion demand. Pattern changes can be made with a minimum of interruption. Roller conveyor encircles the area for mold set-off, and if metal is available, the unit will allow a continuous pour operation. However, the area encircled by the roller conveyor is also serviced by an overhead crane, and molds may be stored before pouring. Since the sand storage bin holds about a two-hour sand supply, the molds may be left overnight and shaken out the next day. The balance of the sand can thereby be stored in the molds on the floor. In the case of continuous pour, the two-hour storage is sufficient for proper operation. Flasks are returned directly to the molders from the vibrating shakeout.

The vibrating shakeout is located so that the castings are delivered directly into the cleaning room. The handling of all materials in the mechanized unit is at a minimum, thus reducing substantially the indirect labor involved in producing the castings.

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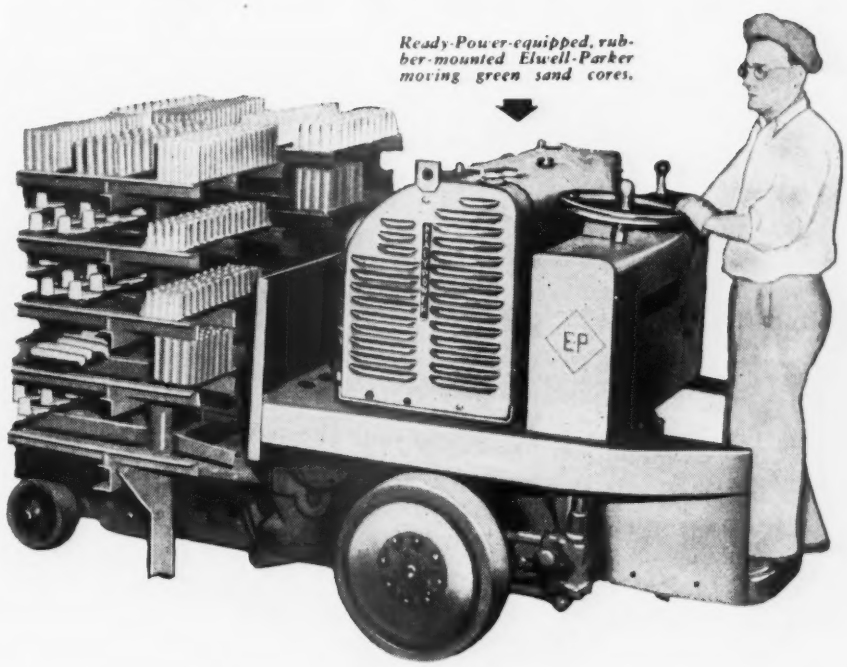

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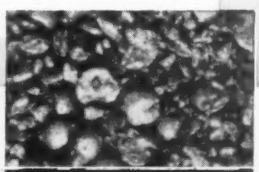
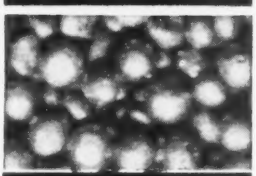


CHILLED IRON No. 230 at Mag 10X (after 50 passes)



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alternatively as cope and drag units.

Fig. 5 shows the four-station mechanized molding unit for this work. The production demands for sand were such that a mixer was located overhead to serve this unit. It will be noted that this unit is not confined to one type of sand, since four sands of various moisture and strength can be produced if required.

A separation between the two pairs of hoppers allows a core-setting area, should the occasion demand. Again, a large area is encircled by the mold conveyor which can be used for mold storage if necessary. However, continuous metal was available for this unit.

While the second unit more nearly approaches the design of a production foundry unit, it allows the advantages to remain without the dangers of misapplication to a semi-production field. For example, automatic mold dumping can be alternated with tight flask push-off. Or jib crane service can be used for individual handling at the shakeout, depending entirely upon the nature of the jobs being run.

Pattern Changes Limited

It will be noted that the principles involved are much the same for both units and are patterned after many such small units built in recent years.

With such units, it is generally considered wise to limit the number of pattern changes to three or four a day. Some of the jobs on the No. 1 cope and drag unit run as high as 30 to 40 per hour; a minimum run of about 50 molds would justify placing this job on the unit. Squeezer production on the No. 2 unit varies from 60 to as high as 100 molds per hour, depending on the job. Here about 80 to 100 molds would enable the job to be produced on the unit. Simple pattern changes can be made more frequently without jeopardizing the over-all picture.

Of great interest is the possibility of operating a number of such units for the greatest percentage of time. A shut-down, mechanical or otherwise, of one unit or one piece of equipment does not tie up the rest of the foundry's production as is the case with many large mechanized units. By the same token, during valley periods limited production can be obtained without the burden of operating and maintaining an extensive system.

Approaching the problem of cost reduction through limited mechanization, a progressive step-by-step program allows the financial structure of the business to be within safe

operating ratios. Dangerous burdens and prohibitive amortization costs, a prime factor during any phase of the economic cycle, can be avoided by careful planning, and the business volume will establish its own curve consistent with the production ability of the foundry.

Steel Founders' Society

(*Concluded from page* 91)

have increased both production and backlogs in expanding amount, in the interim.

Shipments in 1950 totaled 1,460,000 tons; and indicated production for 1951 is in excess of 2,100,000 tons. The industry's rate of production during 1951 was 145 per cent that of 1950—and portents of 1952 indicate the probability of a new high level.

Thus, in its 51st year, Steel Founders' Society of America can look ahead with optimism and with determination to render increasingly useful services to its members, to the industry with which it has grown, and to the legion of other industries which need and use the products of the steel foundries.

The steel castings industry is demonstrating the recognition of its obligations to the defense effort. Employment has more than doubled. The present rate of production represents an increase greater than for any comparable industry, accomplished despite material and manpower shortages. There is every reason to expect that the society and the industry will continue to meet the responsibilities of the future.

Book Review

The Grinding Wheel, by Kenneth B. Lewis, cloth, 409 pages, 6 x 9 in., published by the Grinding Wheel Institute, Cleveland. Price $3.50.

Intended to give a reader a solid grounding in fundamentals of abrasive technology, this book starts with a discussion of grinding in general, then outlines abrasive materials and bonding agents used in wheels and wheel shapes. A section is devoted to grinding fluids, and subsequent chapters deal in detail with various grinding practices.

Concluding chapters are devoted to factors affecting wheel selection, the design of parts to utilize grinding as a production process, and a discussion of grinding costs. An appendix provides grinding wheel recommendations, discussion of grinding errors, grinding wheel safety, standard wheel markings, and a glossary of grinding terms.

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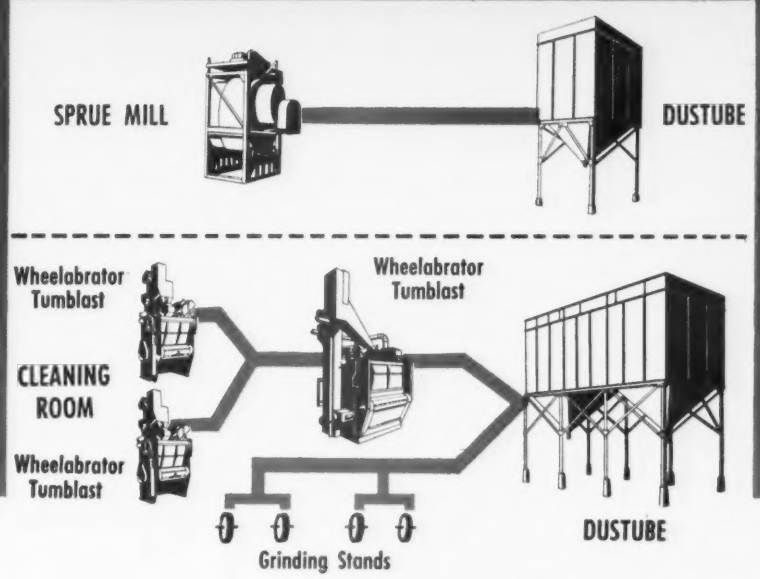

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Adventures of

BILL

By PAT DWYER

Illustrations by RICHEY

ONE of the seven wonders of the world, at least to me—although I am willing to admit that other people may have been equally impressed—is the manner in which a child's mind develops. For the first two or three years the mental process and vocabulary are about on a par with the physical development. Exhibition of mental agility is confined to (a) constant request for certain forms of food on the forbidden list, or (b) constant, loud and determined refusal to accept the food selected by the ever loving parent or parents.

Gradually by sheer weight and number, augmented by judiciously enforced periods of fasting and prayer, the parent or parents establish a formula or system for introducing the required amount of nourishment into the squirming bodies of each jumping Jack and Jill at definite periods. Physical growth, the result of this treatment, can be—and of course is—carefully measured daily or weekly through the medium of the bathroom scales and the tape measure from Mommy's sewing basket.

Measuring the mental growth is not so simple. I might go a step further and claim it is impossible. What mysterious gift enables a child to pick up words oral or written? How does he or she learn that a word may have a double meaning? Where does he get a sense of humor? These sage reflections were prompted the other night while two seven-year-old heroes were quizzed in a spelling lesson by their mother. At the end of the lesson one lad said, "All right, Mom. You have had your turn. Now let me ask you to spell a word."

"Certainly," she said. "What is the word I am to spell?"

"Rhinoceros," he shouted, and then rolled over on the floor.

When I mentioned the incident to Bill he admitted that was indeed a tough test. If betting was as legal as it was popular and prevalent, he would be willing to wager any reasonable amount, say up to 2 bits, that in any group of 12 adults selected at random, 11 members could not spell the word correctly. The offer, he was careful to explain, did not apply to children. Avid followers of the breath-taking adventures of Tarzan and other mythical heroes in the so-called comics, they know the names of more animals than Noah had in the Ark, and that includes the kangaroo and Hopalong Cassidy.

"Talking about rhinoceroses," Bill said—"I can say it, but don't ask me to spell it—I had a letter recently from P. D. Forbes, an old West coast friend, a former patternmaker who learned the trade in Scotland. The letter was prompted by a visit to the famous Snow Museum in Oakland, across the bay from San Francisco. This natural history museum, housing the collection of the late H. A. Snow is on a 10-acre estate on the edge of Lake Merritt, surrounded by beautiful homes and lawns, a short distance from the Oakland business district.

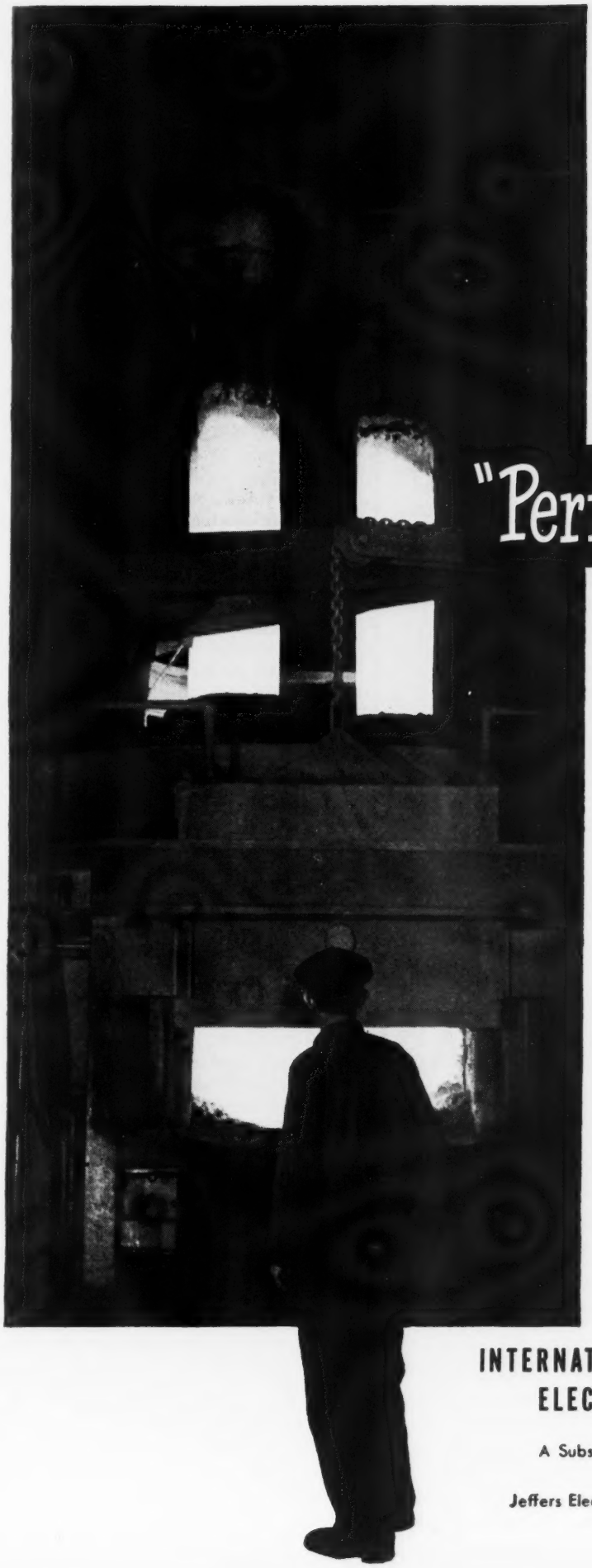
"A tall, rangy lad at 16, young Snow left school and joined the Army for a year fighting the Apache Indians. Other activities, before and after that period, included trapping animals in the Santa Cruz mountains and collecting bird's eggs. After a short term in a business school and a lowly job in a grocery store he learned the molding trade and for several years worked as a journeyman molder in the James Graham Mfg. Co. foundry in Newark.

"Always uppermost in his mind was the desire to earn a living along the lines of natural history. He was a natural lover of birds and animals. Every season found him in the field collecting specimens. Finally he built up a collection of bird's eggs ranking as one of the foremost in the world. With this collection he had many birds and animals mounted in habitat groups. Following a desire for outdoor activity and more financial remuneration he became a contractor, cattle raiser and garage owner. About 1906 he first began to think of a hunting and collecting trip to Africa. A few years later, following publication of Theodore Roosevelt's description of his hunting adventures in Africa, the desire became more active. The financial feature still was the dominant preventive factor. Finally the p r o b l e m was solved in 1919 when he set out for Africa. He returned in 1922 with 125,000 ft of movie film, also the largest and most complete collection of animals, birds and insects ever to come out of Africa.

"The pictures primarily were taken as a record of the trip, and with the secondary thought that they might have some financial value. The photos were incidental to his main purpose as a naturalist. To his pleased surprise and legitimate gratification the pictures created a sensation and made him independently wealthy.

(*Continued on page* 252)

Hunter neatly and skillfully disposes of a hostile hitch hiker



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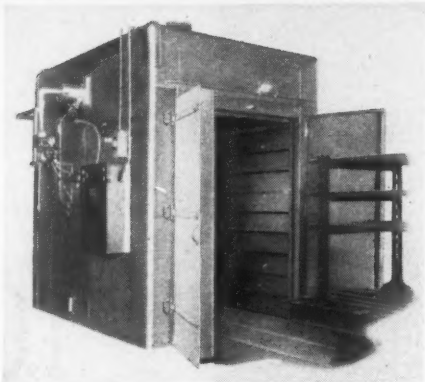

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(*Continued from page* 250)

The picture "Hunting Big Game in Africa" was purchased by Universal Pictures for $300,000. Later another picture, "Hunting Big Game in the Arctic," was sold to Fox for $200,000. After an extended lecture tour he eventually gave the entire collection to the city of Oakland as an outright gift worth over $1,000,000. In 1927 at the comparatively early age of 57 he died as the culmination of a disease contracted in Africa.

"When he started on his African trip he knew practically nothing of the dark continent or of the methods for hunting big game. In a general way he realized the danger of meeting ferocious lions, rhinos, elephants, buffalos, poisonous reptiles, also the fevers and other diseases indigenous to the soil, the air and the water. Despite all handicaps he brought back to Oakland 65 different species of animals, 20,000 butterflies, 10,000 moths, 10,000 bugs and other insects, 1500 birds, 250 animal heads, a small ethnological collection, 5000 bird's eggs and a considerable amount of miscellaneous material. The city of Oakland erected a new building to house the collection.

"In Africa his outfit was drawn by oxen and mules. Disease and the tsetse fly created so much havoc with the animals, he disposed of the remainder and pursued subsequent activities by automobile. A great expanse of veldt is level ground sparsely covered with trees. A car could be driven over the trackless plains at high speed. He discovered that while antelopes, giraffes and other wild animals can run with tremendous speed for a short distance, they can not maintain that speed for any length of time. His flivver, running at 25 to 30 mph, could tire them out in a short time.

"After sighting an animal herd the hunter would make a wide circuit and then begin rounding the animals up in American cowboy style. Soon he would be in position to drive them toward the place where the photographer had set up the moving picture camera. Some of the close-ups were thrilling.

"In addition to rounding up animals Snow on several occasions hunted lions with the flivver. On one occasion he surprised a group of five that had just made a kill. This incident nearly finished the trip so far as the hunter was concerned. He had only four cartridges in his gun. He killed two lions and wounded a third. The fourth, a lioness, charged him. In her leap she passed so close to the steering wheel under which the hunter was crouching, that she almost demolished it. She landed in

the back seat. A quick swerve of the machine dislodged her and threw her out. Speaking of the incident afterward, Snow modestly admitted he did not stop the car and get out to see if the rapid and involuntary spill had hurt the lady. On several occasions charging animals knocked down and broke camera and tripod before they died. On other occasions a charging rhinoceros or elephant was not brought to his knees until within 9 or 10 ft of the camera."

"A highly interesting story," I said. "Bro. Forbes wields a very nimble pen. If and when the winds of chance blow me to California, certainly I shall treat myself to the pleasure of visiting the Snow Museum, and incidentally learn how to spell rhinoceros. Anything else turn up in the mail recently?"

"Well," Bill said, "I'll tell you. 'Tisn't every day I get a gem like the foregoing. Mostly I hear from lads who want foundry information. The other day a man from the wide open spaces wrote that he would appreciate information on cast iron core arbors for soil pipe fittings. Specifically he inquired if arbors for T's and Y's can be made in two or more parts so that they can be removed from the castings and used again.

"I told him that green sand cores for soil pipe fittings are made according to two methods. In the first or *A* method, the pattern serves as a pattern and corebox to form mold and core at one operation. In the second or *B* method the core is made independently and placed in the mold after the pattern is removed. The first method is subject to further subdivision. Thus in (a) the core is lifted out of the mold to permit removal of the drag half of the pattern. Then the core is returned to place. In (b) the mold is rolled over twice. The core is not moved from its position at any stage of the process. The cast iron pattern for either *a* or *b* is an exact replica of the desired casting, with the exception it is split longitudinally through the center, is provided with dowels and dowel pins, is highly finished and is slightly larger than the resulting casting to compensate for anticipated and inevitable contraction.

"In the first or *A* method the drag half of the pattern is placed on a follow board. The drag is rammed and rolled over in the usual manner. A small quantity of sand is placed in the pattern and the cast iron arbor is pressed down into the sand. The drag half of the pattern then is filled with sand, pressed down by hand. The cope half pattern is adjusted in place. Sand is packed by hand in through the open ends. The

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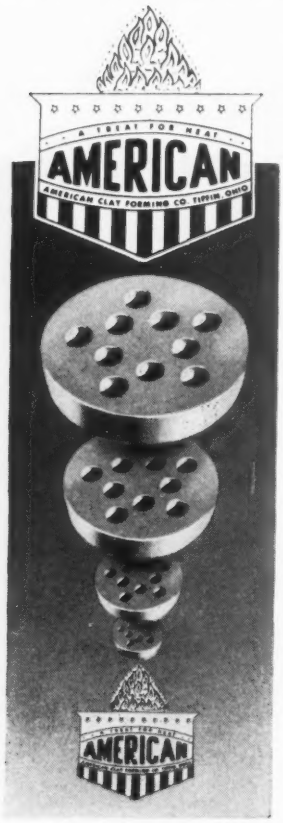

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cope is rammed and lifted off. The top half of the pattern is removed. The core is lifted out and placed temporarily on a convenient stand or bench. The drag half of the pattern is removed, the core is replaced and the mold is assembled and weighted.

"In the second or *B* method, drag, core and cope are rammed as in the preceding instance. Then the entire mold is rolled over so that the cope rests on the bench. The drag is lifted off and the drag half of the pattern is removed from the core. The drag is replaced and the entire mold is rolled back to the original position. The cope is lifted off and the cope half of the pattern is removed. The cope then is replaced. The core resting in the end prints is not disturbed at any time. Adoption of either method depends almost entirely on the shape and size of the casting. The first method is particularly adapted to short, chunky castings in which the core will stand without an arbor, or with an arbor of the simplest shape.

"Where the molds are made on machines employing solid patterns, the cores are made in hinged corebox and booked. The arbor is placed in the drag half corebox. Sand is packed by hand in both half boxes and scraped off flush. Both halves are raised to a vertical position until the sand faces touch each other. The assembly is lowered back on the bench with the drag half underneath. The cope half corebox is removed or swung back on the hinges. The core is lifted out and placed in the mold.

"In a prominent eastern foundry soil pipe fittings in almost infinite variety are made on a battery of squeezer type molding machines. The molds are placed on revolving tables. In a carefully worked out program, 1000-lb ladles suspended from a monorail arrive at the turntable in orderly succession and the metal is poured into the molds. Before the molds complete another revolution they are dumped over the side. The sand falls through a grating onto a reciprocating conveyor leading to the sand preparation plant. Castings are loaded in trucks and taken to the cleaning room where they are packed in tumbling barrels. Flasks and arbors are returned to the molding station.

"A fairly typical shape for the arbor is a rectangular backbone or central member with a number of short projecting members on each side. On large arbors and on shapes that cannot be removed readily from the casting, the wings are provided with central openings. They are slipped over the backbone and tightened with small wood wedges. In other in-

stances, for example a *Y* fitting, the arbor is in two parts locked in the center with any one of many varieties of mortise and tenon joints. The projecting prong on one section is slightly tapered and fits into a tapered hole in the other section. Where the parts do not fit tightly, a small wood wedge is driven between them."

Apprentice Program

(*Continued from page* 97)

nance of foundry equipment, etc., will be discussed.

The coremaker apprenticeship extends over a four-year period, 208 forty-hour weeks. The first year the apprentice is moved from place to place on the molding floor to learn why, how, when and where cores enter into the cycle of operation in the production of castings. On the green sand molding floor he has 2 weeks squeezer molding, 2 weeks jolt-strip molding, 2 weeks loose pattern floor molding, 4 weeks loose pattern bench molding, 2 weeks mounted patterns bench molding. Then he has a term of 6 to 8 weeks in the pattern shop.

The dry sand molding period in the side floor department includes 10 to 14 weeks, or approximately 6 weeks pattern set-up and slinger floor, 3 weeks pattern drawing and finishing floor, 5 weeks core-up, runner basin construction on closing floor. The 8 to 16 weeks on the heavy floor department is divided approximately as follows: 10 weeks sandslinger molding floor, drawing patterns and finishing, 4 weeks core-up, runner basin construction and closing molds.

For the remainder of the apprenticeship period, approximately 160 weeks, he works in the coreroom first on small and medium size cores independently and later assisting journeymen coremakers on large, heavy cores. He will learn coremaking principles, the way cores must be prepared for the molder and something of material and engineering requirements of good coremaking technique.

On the core bench for 56 weeks he makes small plain cores, learns how to paste, blacken and make core assemblies, also the fundamentals of proper ramming, wire reinforcement, location of vents, technique of drawing the corebox from the sand, operation of the core ovens and proper blacking procedure. Through it all he is instructed in the materials and methods for preparing core sand mixtures, including biweekly sand tests.

In a 16-week period on the core blowing machines he is taught the principles underlying the process.

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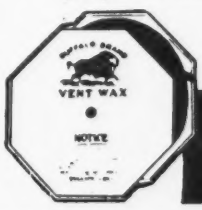

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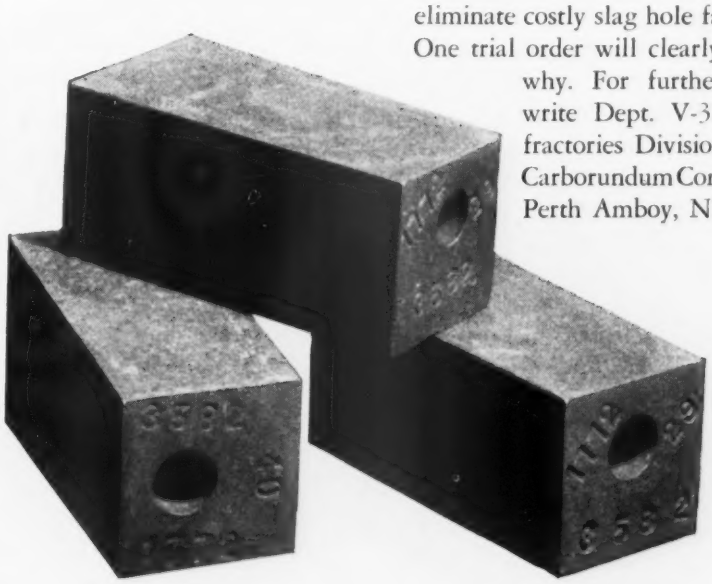

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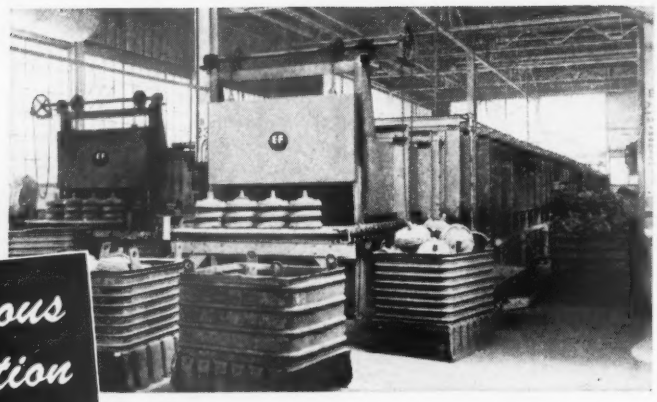

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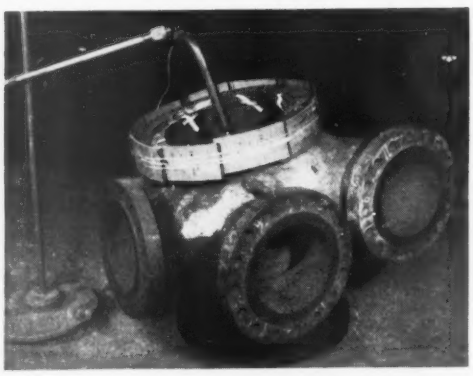
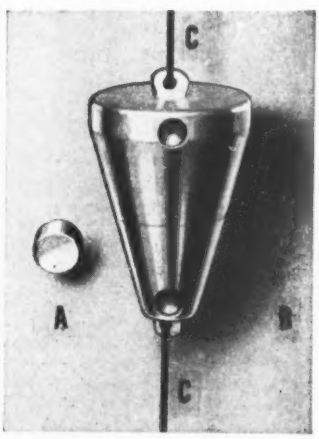


Radiographing a flange on a heavy steel casting.



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reasons for the vent and blow hole locations in the coreboxes. Later, speed, skill and dexterity of machine operation are stressed.

For approximately 88 weeks he is assigned to the floor where cores of a larger, heavier variety are produced and prepared for use in the foundry. He learns how to form cores with sweeps and skeleton frames as well as coreboxes. In the beginning the apprentice will work with journeymen coremakers. Later, depending on his ability, general know-how, skill and confidence, he will work independently.

Through careful supervision during the training program, Fulton Foundry is confident that these apprentices as journeymen will eventually, (1) produce higher quality castings with less scrap; (2) be happier employees since they will work in the molding or coremaking departments of their choice plus the feeling of security which comes from the knowledge that they have been thoroughly trained in the vocation of their choice. (3) From the foundry's standpoint, these well-rounded journeymen can be moved, if necessary, anywhere in the foundry to fill in departmental employee vacancies and, last but not least, (4) a training program such as this will ultimately attract higher quality apprentices to the foundry industry.

University To Build New Materials Testing Center

What is claimed to be the world's largest vertical universal testing machine is to be installed in a new building, adjoining Fritz Engineering Laboratory at Lehigh University, Bethlehem, Pa. Total cost of new equipment and building, planned for completion by September, 1954, is estimated at $1,200,000.

The large testing unit is a 5-million-pound capacity hydraulic tension-compression machine. Additional machines and equipment also will be installed, and provision is to be made for photoelastic laboratories, photographic dark rooms, a metallographic laboratory, office, and conference workrooms for the research staff.

Primary responsibility for the design and supervision of construction and installation of the large testing machine will be shared by representatives of Bethlehem Steel Co., Baldwin-Lima-Hamilton Corp., Philadelphia, and Prof. William J. Eney, head of the department of civil engineering and mechanics and director of Fritz Laboratory.

Gates and Heads

(*Continued from page* 115)

of feed metal that heads are usually incapable of making the section sound.

An exhaustive study of this phenomenon, made by S. W. Brinson and J. A. Duma, Norfolk Naval Shipyard, Portsmouth, Va.,[25] shows that center-line shrinkage is serious in sections ¼, ½ and 1-in. thick, slight in 3-in. sections, and practically absent in 4-in. ones. Only the very bottom is sound in ¼-in.-thick pieces 12 in. high, cast vertically, while all but the upper portions of 4-in.-thick sections of the same height are completely solid. Fig. 35, from their paper, shows the relative amounts of unsound metal found in sections of varying thickness, 12 in. high, cast with top heads and gated on one side at the junction of head and casting.

Their studies further show that if the pieces are cast at an angle with the vertical, or even flat, with heads and gates of the same type, the extent of the shrinkage is but little affected. The only difference they found was that the unsound areas tended to lie toward the upper surface, rather than at the center line, of the pieces cast at an angle of 45° to the vertical, or in a horizontal position. Variations in the pouring temperature of the steel were shown to have little if any effect upon the degree of unsoundness in any given section. Fig. 34, from the Duma and Brinson paper, shows typical center-line shrinkage areas revealed by x-ray examination of sections ½-in. thick cut from 1 and 2-in. plates, respectively.

The remedy for center-line shrinkage is to secure somehow directional solidification in the section from bottom to top, to so marked an extent that at any given moment after pouring, the dendrites at each successive level will have reached the median line of the piece while a considerable mass of unfrozen steel lies immediately above them. There will then be liquid steel available to close up the voids at each level as fast as they form.

There are several possible ways of securing the necessary degree of directional solidification. One is to so vary the heat-absorbing capacity of the mold walls that the piece will cool progressively more slowly from top to bottom. Apparently the only way to apply this method with complete success is to use metal chills. To be completely effective, the chills should be heavy at the bottom and taper steadily to the top of the mold. The

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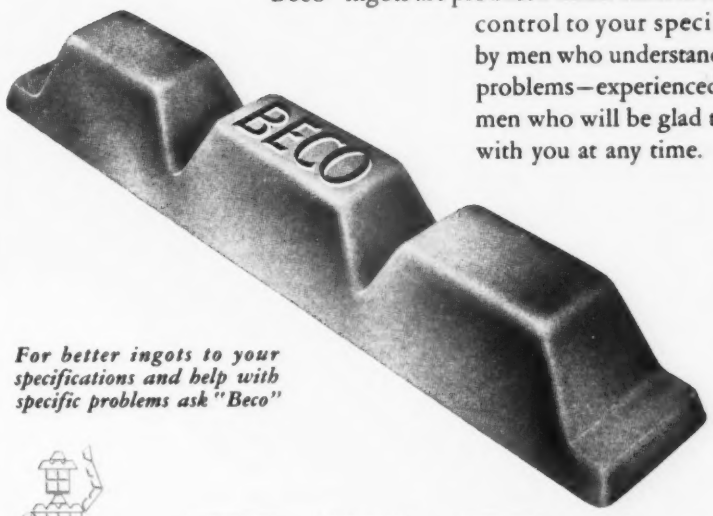

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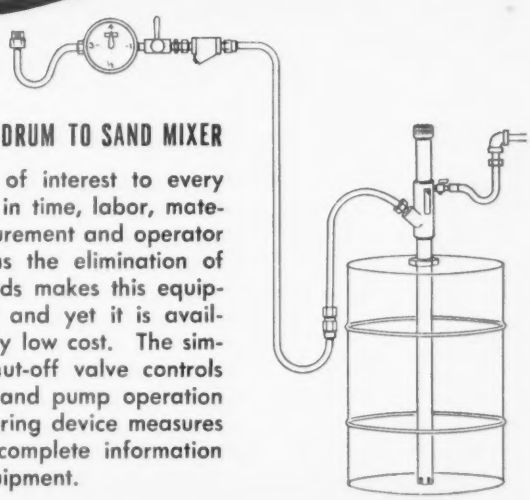

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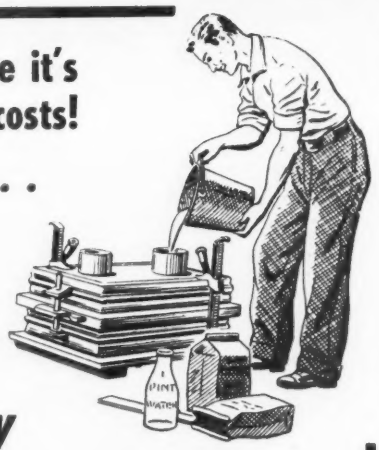

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Cleaning cost at .03 lb.	3.75	Cleaning cost at .03 lb.	18.75
Shrinkage 6%	2.25	Shrinkage 6%	11.25
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only instance in which this method is used with entire success is in pouring steel ingots in cast iron molds. It may be applied to steel castings, at least to the extent of using chills in the lower portions of thin sections. When the piece is gated at the bottom, however, chills so placed may cool the first metal entering the casting, which forms its upper portions, and become so heated themselves that their chilling capacity is almost exhausted. The result, of course, is that the top of the casting is filled with metal considerably cooler than that at the bottom, so that directional solidification from below upward is not secured—in fact, exactly the opposite condition exists.

Preheating the cope or the upper parts of the drag would theoretically produce the required directional solidification, but this method is very hard, if not impossible, to apply in actual practice. Effective stepgating, especially if the mold is filled slowly so that the solidification of the successive layers takes place almost as fast as the steel enters the mold, would also give the desired results, but can be applied in only a comparatively few cases.

(To be concluded next month)

References

24. "Necked-down Risers Without Core Boxes, Patterns or Baking," Harbison-Walker Refractories Co., Pittsburgh 22, Pa.
25. S. W. Brinson and J. A. Duma, "Studies on Center-line Shrinkage in Steel Castings," *Transactions*, American Foundrymen's Society, Vol. 50, 1942, Page 657.

Quality Control Meeting To Be Held in May

Sixth annual convention of American Society for Quality Control will be held May 22-24 at Syracuse, N.Y. Convention headquarters will be the new Onondaga County War Memorial Auditorium. Under the general chairmanship of Leon Bass, General Electric Co., Syracuse, the program has been planned to include technical discussions on 18 major phases of quality control, including steel foundry and fabricating. In addition, 11 hours of instruction will be presented on the basic principles of quality control.

The convention will feature also exhibits of manufacturers showing phases of quality control activities in their operations as well as many gage manufacturers displaying the latest in their equipment.

German Institute To Meet

Giesserei-Institut, foundry institute of Aachen, western Germany, has announced a technical meeting to be held Mar. 12-15.

One Way To Repair a Damaged Casting

of Foundry Practice

By PAT DWYER, *Engineering Editor, FOUNDRY*

IN recent years the electric arc, oxyacetylene and thermit welding processes have been applied with considerable success to repair broken and defective castings. However, the gray iron foundry not equipped to perform any of these types of welding can resort to the old original remedy of pouring a sufficient quantity of molten metal into the cavity to fill it and at the same time fuse the surface so that the patch becomes a permanent part of the casting.

If the work is not done properly, the resulting patch will condemn the casting for one or more of these three reasons: The new metal will not have fused properly with the old; the edges of the patch will be too hard to machine; the casting will crack in cooling. The crack may appear at the edge of the patch where it adjoins the old casting, or it may appear in the body of the patch itself. In the latter instance it is apparent the new metal fused perfectly with the old, but an expansion strain was set up during pouring which resulted in a rupture while the casting was cooling.

Shape of the casting is the principal determining factor as to whether or not a job of this character should be attempted. Composition of the iron in the casting also must be considered. The softer the iron the more readily it may be repaired, and the less likelihood is there of the casting cracking due to expansion and contraction strains.

With certain shapes—for example, where a straight casting has broken completely apart—these strains are negligible and present no hazard. The two broken ends are brought together. The remainder of the casting is supported in a natural manner and a stream of iron is poured on the fractured ends until they are fused. The patch is covered with ashes or dried sand and allowed to cool. It is apparent that no undue expansion strain has been set up in the casting. Therefore, the little contraction involved will be taken care of normally.

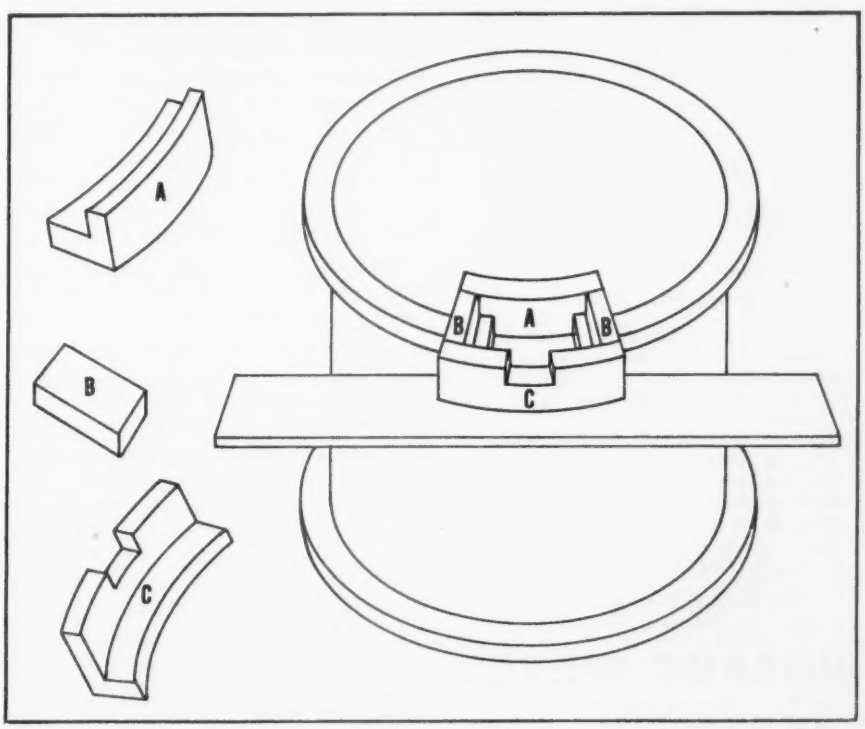
When a cavity exists in a casting, or if it is necessary to repair a gap in the edge, conditions are radically different. Unless the casting is preheated, heat of the molten iron will expand the casting near the void and crack the casting either at the time it is poured or while the patch is contracting. The following incident illustrates how such a repair can be made successfully.

An engineering firm, handling extensive additions to a steel plant, fabricated most of the equipment in its own shops and shipped it to the steel plant ready for erection. With a view of saving time and freight charges a fairly sizable tonnage of the required castings was placed with foundries within 100-mile radius of the plant.

A local foundry furnished some of the castings and also took care of emergency jobs that turned up almost daily. Among the castings shipped in from an outside foundry was a body of a small butterfly valve, a short pipe section approximately 30 in. diam, 30 in. high and flanged at both ends. In some manner the casting fell out of the slings while it was being unloaded at its destination, and a section of one flange about 6 in. long was broken out.

The casting had been faced on both flanges and drilled for bolt holes. Since replacement so far from the company's shops involved a possible delay of several weeks the erection superintendent asked the local foundry to quote on a new casting. He was quoted a price that included cost of making a pattern, also machine shop expense for facing the flanges and drilling the bolt holes. As in duty bound, the customer kicked, but the promise of delivery in three days offset his objections. He placed the order.

The broken casting was trucked over to the foundry. There it was decided to burn on a patch that same afternoon, machine the part that night and ship the casting the following morning. The manager called up the customer and said he had revised his estimate. He would deliver the casting in one day instead of three. The customer naturally was curious to learn how he expected to beat the hardest of all handicaps—time. When the mana-



Individual cores and their assembly prior to pouring iron into flange section of valve body. Entire casting was preheated to avoid cracking

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ger calmly informed him that the casting would be repaired instead of a new one, he laughed. He admitted that a passable job could be done on a plain straight casting, but claimed that any attempt to burn a patch on the flange would split the casting from top to bottom.

The old casting had arrived in the morning, allowing ample time to test the burning process with the first metal from the cupola in the afternoon. If it failed, two hours remained in which the patternmaker could prepare an emergency pattern to make a casting in the orthodox manner the next day.

From the pattern storage a segmental flange corebox that conformed closely to the circle of the casting was selected. Two cores (*A* and *C* in the accompanying illustration) were rushed into the oven. The wall of each core was built up an extra 2 in. by hand. Several pieces of slab core *B* selected from the stock pile were filed to fit between the cores at each end on top of the flange. The accompanying sketch, not drawn to scale, shows how the mold appeared before the metal was poured into it.

Casting Became a Stove

To eliminate the hazard of expansion and contraction of the flange it was decided to heat the entire casting to a good red heat. The simplest way to do this was to convert the casting into a stove. Two rows of bricks were set up parallel and about 30 in. apart on the foundry floor. Scrap grate bars were placed on the bricks and the casting set on to the improvised grate. A coke fire was built inside the casting and in about a half-hour the casting was red all over. The necessary equipment was assembled close to the casting and, after the cupola blower was started, the mold was prepared in the manner shown in the illustration.

The coke was pushed back from the section to be repaired and the entire fire was covered with sand. One section of the flange core *A* was adjusted on the inside of the ring and a quantity of floor sand was rammed behind it to hold it in place. A plain core plate was supported on two brick piers on the outside. The second flange core *C* was placed on the plate and packed up against the flange of the casting. A piece of pig iron and few shovelsful of sand held it in place. The two pieces of flat slab core *B* were placed on top of the flange about 1 in. back from the break. They were anchored in a similar manner.

At this stage a ladle of smoking-hot metal was swung into position,

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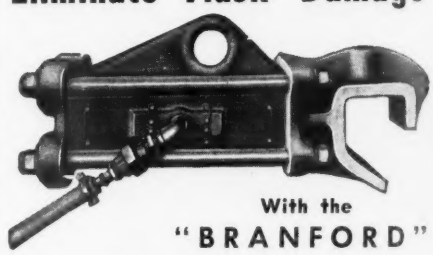

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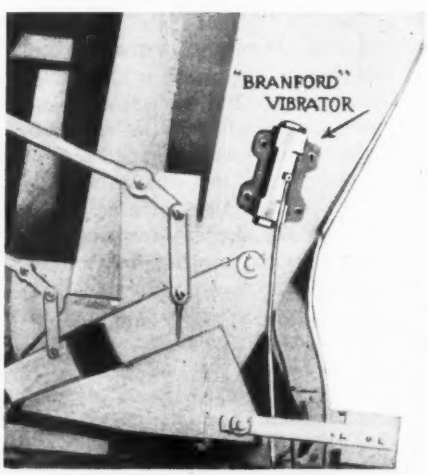

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and the remainder of the operation presented no difficulty. Two men tipped the ladle in such a manner that the stream was directed to all parts of the exposed surface. A third man, armed with a bent rod, "felt" all over the worked surface until he was satisfied that old and new surfaces were thoroughly fused. With the assurance that the repair apparently was perfect, it was agreed to postpone the machining operation until the following morning. The fire was allowed to remain in the casting until it had burned itself out. The sand was scraped from the top of the fire and more coke was added so that the casting would be maintained at red heat for several hours.

The following morning tapping the patch all over with a hammer failed to detect any suspicious sounds, and the casting was sent to the machine shop. By noon the machinist had removed all the superfluous metal and had taken a light finishing cut all over the surface. Had it not been for the absence of two bolt holes one would have experienced considerable difficulty in detecting the patched section of the flange. Later the two holes were drilled and the repaired casting was shipped the day after it had been delivered to the foundry.

The customer was not convinced. He smiled in a superior manner. "I knew you would have to make a new casting," he said. "That burning-on stuff is all bunk." On the principle that the customer always is right, the manager made no effort to set him right. He billed him for a new casting, including cost of pattern and machine work, and the bill was ok'd cheerfully.

Industrial Ventilation Manual Published

Second edition of the manual, "Industrial Ventilation," has been published by the American Conference of Governmental Industrial Hygienists for those interested in the design and installation of industrial exhaust systems. Its 11 sections are entitled: General principles of ventilation; dilution ventilation; comfort ventilation; hood design; specific operations; duct design; make-up and recirculated air; construction specifications; testing of ventilation systems; fans; and air cleaning devices. Copies of the wire-bound manual may be obtained for $3 from the Committee on Industrial Ventilation, P.O. Box 453, Lansing 2, Mich.

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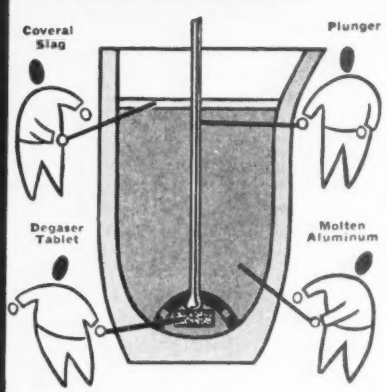

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Book Review

FBI Register of British Manufactures, 24th edition, 1951-52, cloth, 882 pages, 7½ x 9½ in., published for the Federation of British Industries by Kelly's Directories Ltd. and Iliffe & Sons Ltd., London. Price 42s.

Recognized as a standard export reference book to British industry, this book lists over 6000 firms classified by products and services. The firms also are listed alphabetically with their addresses, telegraphic addresses, telephone numbers, products, and in many cases their home and overseas branches and agencies.

Trade associations are classified alphabetically and by trade categories. Brands and trade names are listed alphabetically, and trade marks by trade categories. An addenda covers products and addresses of new members elected after main sections had gone to press. One section is devoted to advertisements of various firms. All information is classified for quick reference in English, French, and Spanish.

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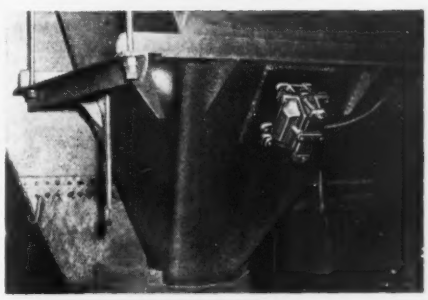

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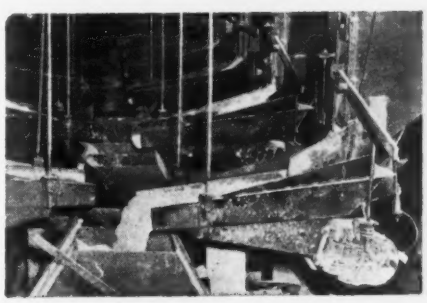

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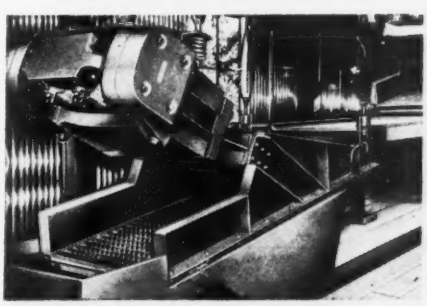

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...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 225

CUPOLA CHARGING: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Bulletin FO-2, "Tips on Improving Cupola Charging," contains information on obtaining a smoother flow of materials from freight cars to cupolas. It tells how mechanical charging can improve and conserve manpower—how to get better unloading and make-up—how improved charging benefits melting—plus other facts that lead to lower costs and increased output.
For More Details Circle No. 90—Page 225

WELDING ALLOYS: Eutectic Welding Alloys Corp., 40-40 172 St., Flushing, N. Y.—Low temperature welding alloys chart contains specifications on nearly 200 metal-joining alloys for use with cast iron, steel, stainless steels, copper, brass, bronze, nickel and nickel alloys, aluminum and aluminum alloys, magnesium alloys and zinc die castings, as well as for hard overlaying, cutting, chamfering, piercing, gouging and joint preparation of all metals.
For More Details Circle No. 91—Page 225

CARBON and GRAPHITE: National Carbon Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Catalog section S-5005 describes carbon and graphite products in grades from porous to impervious for applications in the chemical and process, metallurgical, mechanical and electrical fields. Information is given on sizes and physical characteristics of each product.
For More Details Circle No. 92—Page 225

HANDLING EQUIPMENT: Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9—Illustrated bulletin 5191 describes principal units in the company's line of equipment for floor level handling of materials. Equipment includes electric high lift fork and platform trucks, electric lift trucks for skids and pallets, electric tractors, skids, portable elevators, steel storage racks, and hand trucks.
For More Details Circle No. 93—Page 225

CONVEYOR BELTING: Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.—Bulletin 6915 deals with conveyor belting, having an engineered strength member, for application where there is danger of tearing or puncture, where small pulleys are used, where more flexibility is required, where better fastener life is needed, and where thick, narrow belts are required.
For More Details Circle No. 94—Page 225

VIBRATING SCREENS: Link-Belt Co., 307 North Michigan Ave., Chicago 1—Book 2377 covers vibrating screens for dry screening light and fine materials and liquid vibrating screens for separating solids from liquids. Descriptive material includes specific information on how to select the right screen and screen cloth for maximum operating efficiency; dimension tables, weights, horsepower requirements; and other data of value to the engineer and plant operator.
For More Details Circle No. 95—Page 225

INDUSTRIAL TRUCKS: Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3—General catalog trucks high lift and low lift platform trucks, fork trucks and mobile cranes. It lists capacities and dimensional specifications on each class of company truck and briefly describes major construction features. Several materials handling ideas are presented in picture form.
For More Details Circle No. 96—Page 225

SANDSLINGERS: Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Bulletin 1515 describes all models of the company's sandslingers. It discusses the slinger method of ramming sand into molds, why and when a slinger should be used, and which slinger will do the best job under particular conditions.
For More Details Circle No. 97—Page 225

ABRASIVE CLEANING: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka 2, Ind.—Bulletin 23 presents features and engineering drawings of a new wet abrasive blasting machine, designed for use where close tolerances must be maintained or where the breakdown of sharp edges or corners must be avoided.
For More Details Circle No. 98—Page 225

CRANE CAB CONDITIONER: Lintern Corp., 29-2 Riverside Dr., Berea, O.—Bulletin 5109AC tells how crane cab air conditioning differs from general air conditioning, and how to determine conditioner capacity to handle heat load expected. Temperature tables and recommended sizes of conditioning units for all ambient temperatures are included.
For More Details Circle No. 99—Page 225

COMBUSTION EQUIPMENT: Eclipse Fuel Engineering Co., 1125 Buchanan St., Rockford, Ill.—Bulletin illustrates and describes company's complete line of burners, mixers, valves and blowers used in gas combustion for industrial purposes. One page is devoted to gas and oil-fired steam boilers and furnaces for the process industries.
For More Details Circle No. 100—Page 225

MATERIALS HANDLING: Yale & Towne Mfg. Co., Philadelphia Division, 11000 Roosevelt Blvd., Philadelphia 15—"The How Book of Cost Cutting Materials Handling" contains basic background material covering types of skids, pallets and other handling tools. A plan for evaluating present handling methods through an engineering analysis is included. Bul-

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letin P5151 describes company's complete line of electric trucks in capacities from 1000 to 100,000 lb.
For More Details Circle No. 101—Page 225

NICKEL STEEL: International Nickel Co., Dept. EZ, 67 Wall St., New York 5—Illustrated bulletin on cast nickel steels of the constructional grades, classified by industrial fields, gives data on low-temperature properties, abrasion resistance, depth hardening, and welding. Advantages and recommended specifications and compositions for typical service applications are given.
For More Details Circle No. 102—Page 225

BELT GRINDER: Heston & Anderson, Division of St. Paul Foundry & Mfg. Co., Fairfield, Iowa—Bulletin X-2 describes an abrasive belt grinder equipped for line contact, precision plate, or free belt grinding-polishing of flat surfaces, squares, radii, or shapes. Grinder may be set at the most efficient working angle in any plane.
For More Details Circle No. 103—Page 225

TRACTOR-SHOVELS: Frank G. Hough Co., 703 Seventh St., Libertyville, Ill.—Catalog 205 shows bulk material handling applications of tractor-shovels. Job studies and performance data from certain applications and specification data on the many models and sizes of tractor-shovels are included.
For More Details Circle No. 104—Page 225

COPPER-BASE ALLOYS: Barth Smelting Corp., 99 Chapel St., Newark 5—"Handbook of Copper-Base Casting Alloys" contains federal, Navy, ASTM, SAE and AMS specifications for ingots and castings. A data section contains constitutional diagrams and other valuable reference material.
For More Details Circle No. 105—Page 225

IMPREGNATION: American Metaseal Corp., 607 65th St., West New York, N. J.—Folder describes a combination vacuum-pressure process for impregnating porous castings. Also described is a method for pressure bonding similar or dissimilar materials. Production cycles are outlined for both processes.
For More Details Circle No. 106—Page 225

COMPRESSORS: Worthington Pump & Machinery Corp., Compressor Division, Buffalo 5—Bulletin L-675-B1B covers belt-driven and direct-connected horizontal duplex type compressors. Sizes range from 75 to 3000 hp for both single stage and multistage models for air or gas for discharge pressures up to 10,000 psi.
For More Details Circle No. 107—Page 225

FIRE EXTINGUISHERS: American-LaFrance-Foamite Corp., Elmira, N. Y.—Booklet contains information on modern fire fighting devices, the different fire extinguishing agents used in them, how to use an extinguisher, and the correct type to use on the kind of fire to be extinguished.
For More Details Circle No. 108—Page 225

CLEANING CHAMBER: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Bulletin 222 describes a completely enclosed chamber in which large castings are cleaned by streams

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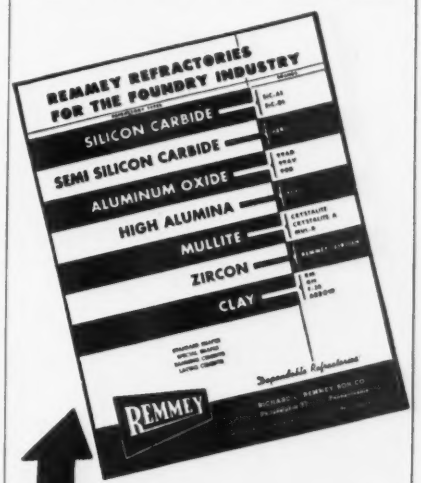

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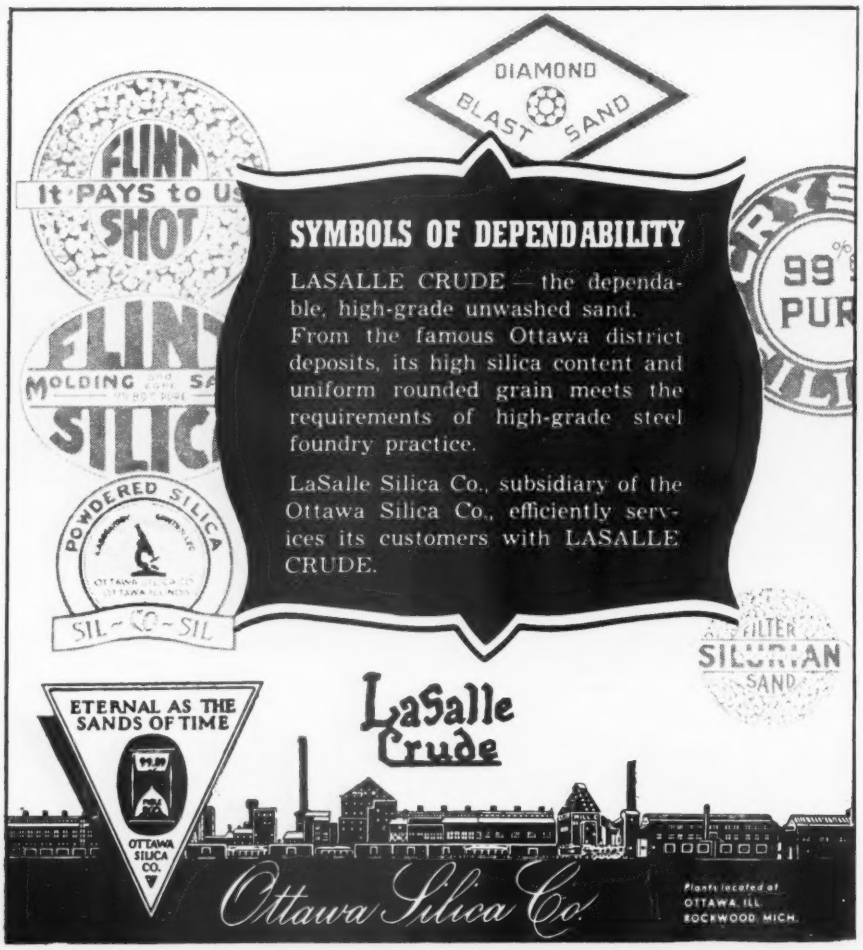
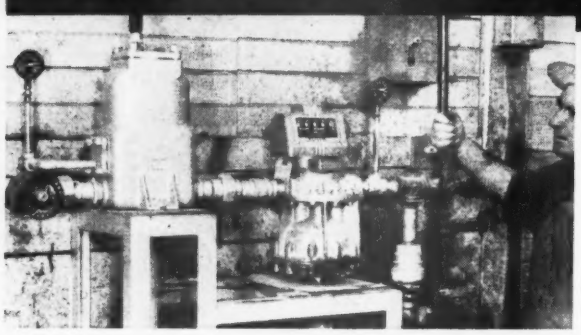


ACCURATE CONTROL . . . of Core Hardness



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of centrifugally hurled abrasives. Information on abrasive reclamation and safety is included and such features as the rotating cleaning table, controlled abrasive density, and proper arrangement of two cleaning jets, are described and illustrated.

For More Details Circle No. 109—Page 225

VIBRATOR: Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13—Catalog 108 illustrates and describes a quiet type air vibrator for eliminating arching, stioking and bridging of material in bins and hoppers. A specification table covering various sizes is included.

For More Details Circle No. 110—Page 225

AIR FILTER: Jas. A. Murphy & Co., Fifth & Vine Sts., Hamilton, O.—Illustrated bulletin 10 covers a combination aftercooler, separator and filter for cooling, cleaning and drying compressed air before it enters distributing lines.

For More Details Circle No. 111—Page 225

SHELL MOLDING: Borden Co., Chemical Division, 350 Madison Ave., New York 17—Booklet entitled "What You Should Know About the New Shell Molding Process" describes the process and materials and equipment used. Mold and coremaking cycles for various resin binders are given.

For More Details Circle No. 112—Page 225

RADIOISOTOPE: Tracerlab Inc., 130 High St., Boston 10—Booklet discusses the use of a radioisotope for radiographic inspection of castings. Equipment for handling the material in foundry usage is illustrated and described.

For More Details Circle No. 113—Page 225

MOTORS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee 1—Bulletin 51B7225 gives construction details of totally enclosed, fan-cooled motors for use where there is dust, dirt, fly ash, rain, snow or corrosive gases.

For More Details Circle No. 114—Page 225

BLAST CLEANING: National Metal Abrasive Co., 3560 Norton Ave., Cleveland—Booklet, also available through all Hickman, Williams & Co. offices, discusses the use of shot and grit in blast cleaning and peening operations.

For More Details Circle No. 115—Page 225

CUTTING TOOLS: Severance Tool Industries Inc., 753 Iowa St., Saginaw, Mich.—Wall chart, tinned top and bottom and measuring 14 x 24 in., illustrates cutting tools representative of the company's line.

For More Details Circle No. 116—Page 225

AIR HANDLING: Sturtevant Division, Westinghouse Electric Corp., Dept. T, Hyde Park, Boston 36—Booklet B-5164 describes equipment for air conditioning, air handling, and air cleaning.

For More Details Circle No. 117—Page 225

MALLEABLE CASTINGS: Belle City Malleable Iron Co., 1442 Forest St., Racine, Wis.—Folder 11 describes the foundry's facilities for producing medium to large malleable castings, known as cope and drag work.

For More Details Circle No. 118—Page 225

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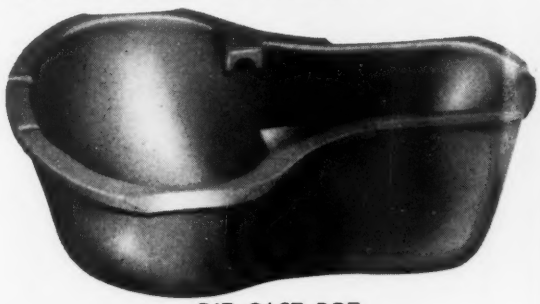

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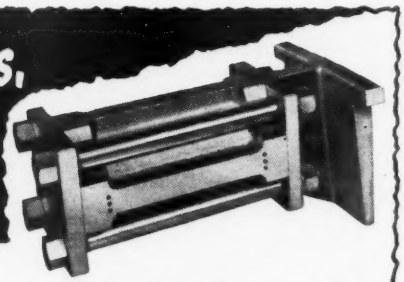
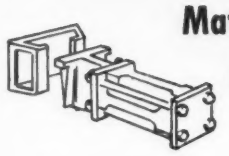


Material Unloading with a CANNON RRHC vibrator



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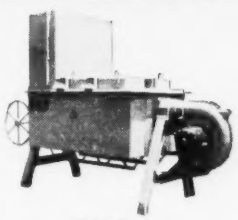
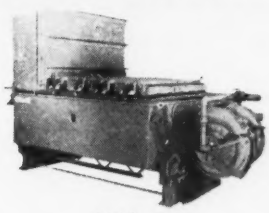


400 Series



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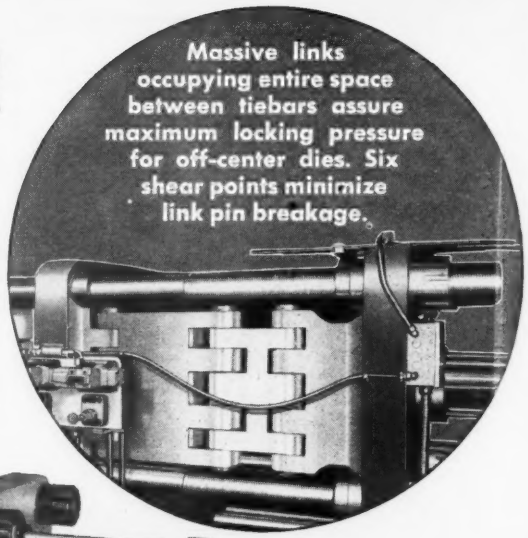

Massive links occupying entire space between tiebars assure maximum locking pressure for off-center dies. Six shear points minimize link pin breakage.

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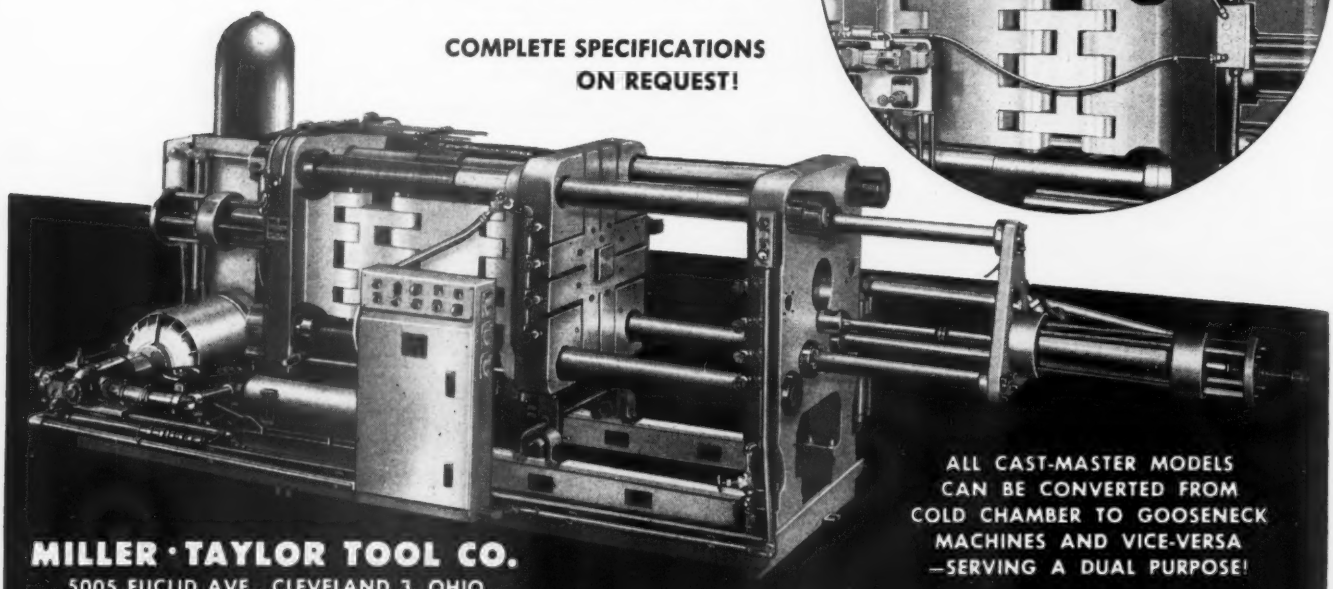

ALL CAST-MASTER MODELS CAN BE CONVERTED FROM COLD CHAMBER TO GOOSENECK MACHINES AND VICE-VERSA —SERVING A DUAL PURPOSE!

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Cleveland

SHOULDER RADIATOR CHAPLET

REDUCES CASTING SCRAP and MAKE-OVER LABOR.

Patented Open Head

ADVANTAGE

The Open Head design permits you to pack sand more solidly under head and around the stem of this chaplet and thus ensure more rigid and dependable core support.

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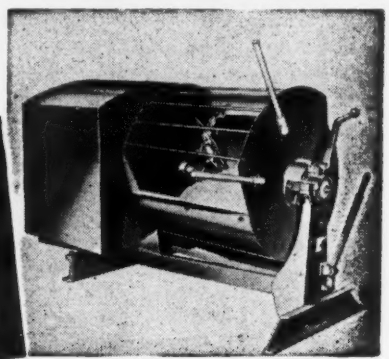
We also make
MOTOR CHAPLETS,
BOILER CHAPLETS,
FORGED HEAD CHAPLETS,
FITTED HEAD CHAPLETS,
DOUBLE HEAD CHAPLETS
and other types.

WONDER *Sand* MIXERS



New Mixing Efficiency

EXCLUSIVE TRIPLE MIXING HOES . . .

Tops in the field! Triple mixing Hoes have adjustable blades . . . easily set for correct clearance. Mixing is *thorough* and "end to end". Advance CMC design makes charging and discharging *easier than ever before!* 6 cu. ft. capacity shown. Write today for full details.

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Easily replaceable, full - hard abrasion resistant alloy steel drum liners are your assurance of lowest upkeep and minimum operating costs.

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- AMASTEEL lasts many times longer. Investigate!
- AMASTEEL provides peak efficiency in shot for blast cleaning and peening. Developed by the maker of "PEENBLAST", "CLEANBLAST" and "ALLOY 99".

Abrasive for any and all kinds of work.

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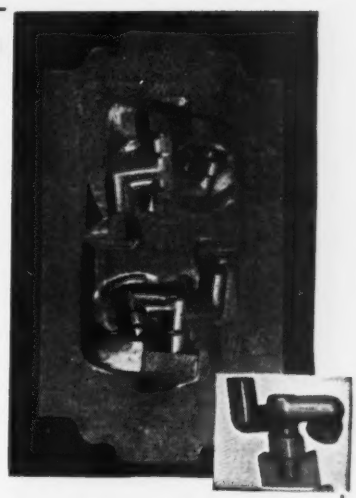
Where Production is the first Consideration, Pressure Cast Aluminum Matchplates and Cope and Drag Plates are the only Satisfactory Answer



Only one master pattern does it! From it we make you single or multiple pattern matchplates, casting them under pressure in plaster molds. Why not find out exactly how much we can save you by this method, or by furnishing cope and drag plates which likewise jump production and lower your costs?

Get our quotations today.

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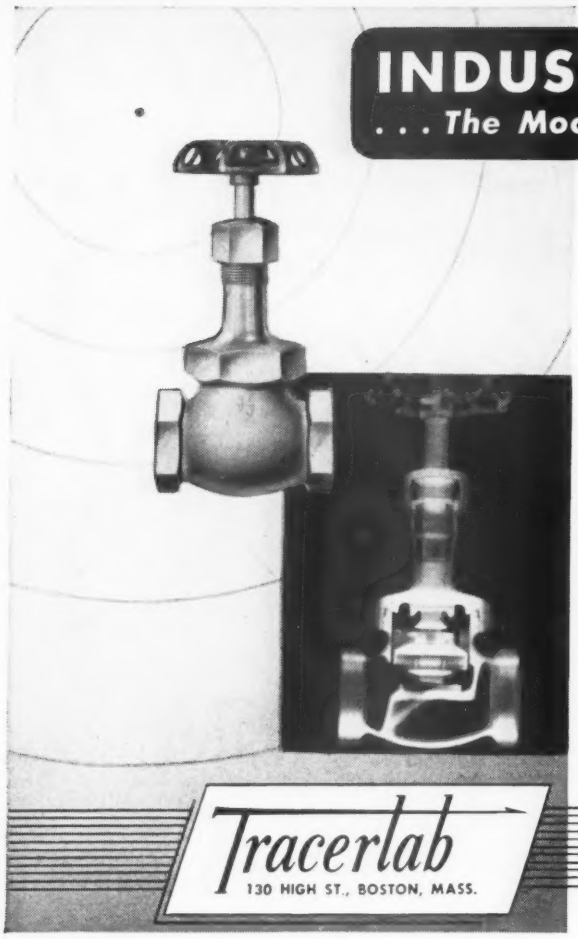
534 State Street Toledo 2, Ohio
AFFILIATE: PLASTER PROCESS CASTINGS CO.
6922 Carnegie Ave., Cleveland 3, Ohio

Pressure-Cast MATCHPLATES
COPE and DRAG PLATES



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Tracerlab Cobalt-60 Radiography sources with their versatility, low cost and practicality, offer foundrymen, welders, and fabricators the ideal means for the non-destructive inspection of metal parts and assemblies.

For many years such inspection has been accomplished by using X-ray machines or radium, but the cost of such machines and sources has been prohibitive, particularly to the occasional user. NOW . . . with Cobalt-60 sources . . . even the smallest foundry and welding shop can radiograph their work to prove its quality.

Desirable characteristics of a radioisotope for industrial radiography are:

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FREE . . . 12-page, fully illustrated booklet gives all the facts on sources, containers, magnetic remote handler, survey meters, personnel protection instruments. Write TODAY for your copy.

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MODEL J is well suited for experimental work in Aluminum, Iron, Steel and Bronze as well as regular production. Casts bearings, bushings, gears, etc. Accommodates interchangeably both permanent molds or sand molds up to 24" in diameter and up to 12" high.

MODEL J is versatile, sturdy and easy to operate to produce economically a wide range of superior castings. It is completely integrated on a single base, readily moved as a unit, and does not require a special foundation.

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MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

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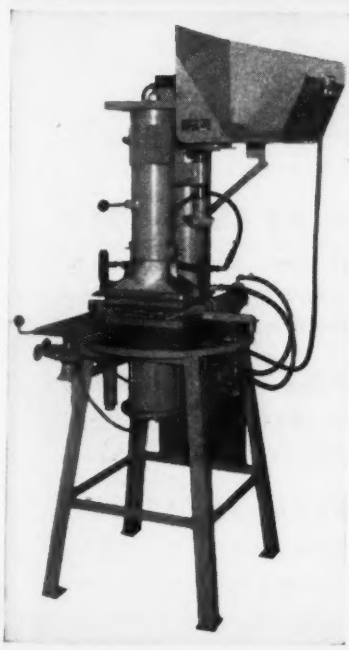


HIGH DRAW MODEL "C-H-E"

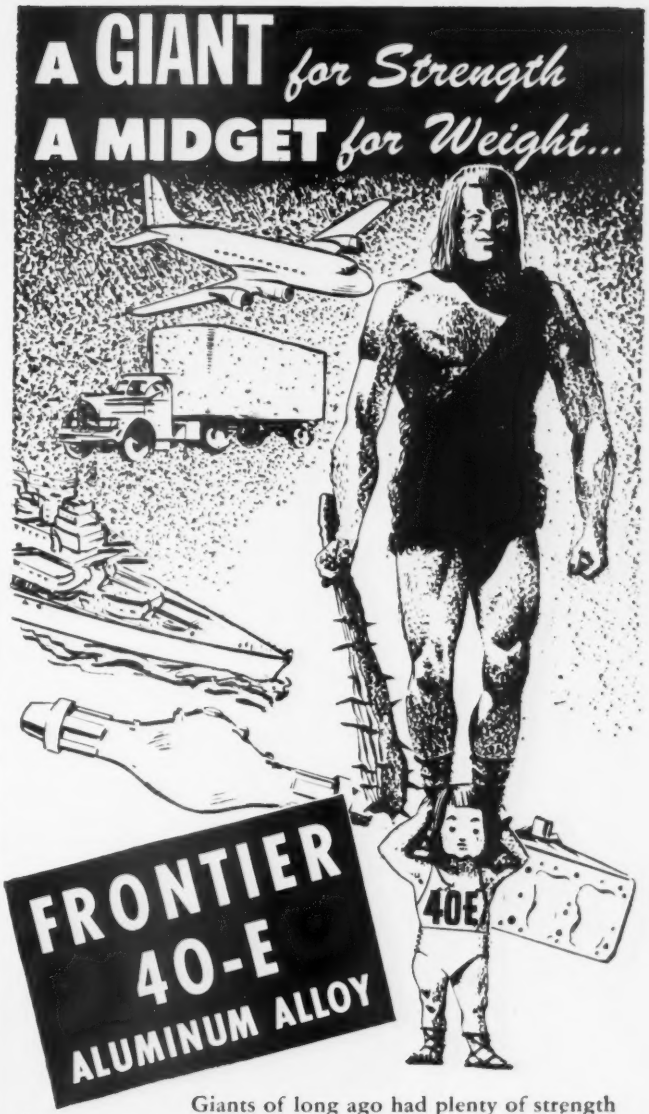
Cores up to 15 lbs.

With the operation of one lever on the hand machine, or pushing of one button on the electric cycle, this machine will —Close the Core Box—Blow the Cores—Vibrate the Box—Draw the Cores—and Eject the Core Box to position where the dryer is applied. Produces more cores with less operator fatigue, and more cores per hour.

•

Let us figure on your requirements.

HARRISON MACHINE COMPANY
Wesleyville, Erie, Pa.



Giants of long ago had plenty of strength but too much weight to make them 100% efficient. Modern industrial might is measured in strength, too, but weight must be kept at an absolute minimum.

In order to give you all the strength you need to meet the casting requirements of the transportation, manufacturing and military fields, *plus extremely light weight,* we have developed FRONTIER 40-E Aluminum Alloy. You'll find this non-heat-treated alloy has excellent machineability, superior shock and corrosion resistance and pressure tightness — all qualities that assure you the production results you're looking for. In addition, there's *test bar uniformity* throughout large castings!

Find out how FRONTIER 40-E can help your product gain giant stature in its field.

WRITE for FREE DATA BOOK and full details on FRONTIER 40-E Aluminum Alloy.

Remember — if ALUMINUM can do it better — FRONTIER 40-E ALUMINUM ALLOY can do it Best!

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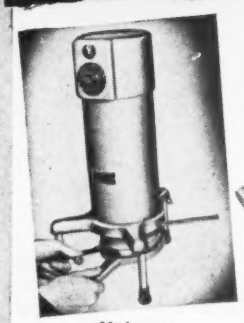
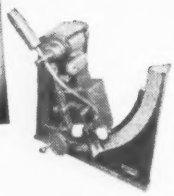
QUALITY CASTINGS *at Low Cost with* SAND CONTROL

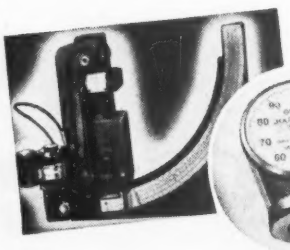


Moisture

• EASE OF MOLDING
Improves with moisture, green strength, deformation and flowability control.



Green Strength and Deformation



Air-Set and Dry Strength

Mold Hardness

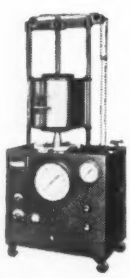
• CASTING CLEANLINESS
Improves with hardness, air-set and dry strength control.

Fineness

Permeability

• CASTING FINISH
Improves with sand grain size and distribution control.

• CASTING QUALITY
Improves with hot strength control, which insures freedom from mold wall and core failure at pouring temperatures.



Thermolab

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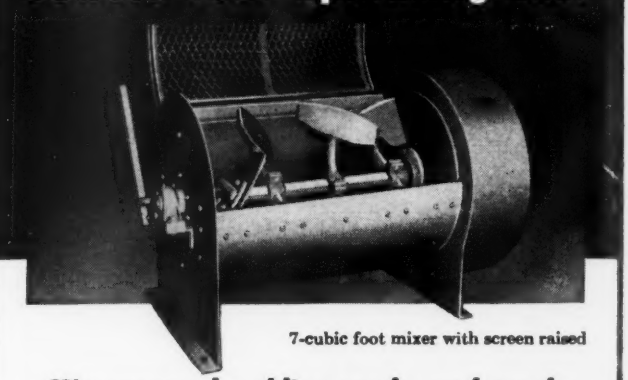
FASTER, BETTER MIXING Lowers Your Operating Cost



7-cubic foot mixer with screen raised

Mix core and molding sands, and cupola patch mixes with MULTI-BLADE MIXERS

• THEY'RE FAST . . . mix and discharge a load in four and a half minutes.
• THEY MIX BETTER . . . the best blade arrangement in any mixer . . . cuts, turns and kneads the mix ten times with every shaft revolution.
• THEY'RE QUALITY BUILT . . . trouble free, self-contained, have anti-friction bearings, direct drive (no clutch or belts), and come in sizes from 3 to 60 cu. ft. capacities. Special and larger mixers also available.

Get these advantages and resultant savings. See your foundry equipment dealer or write direct to

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HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST
because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

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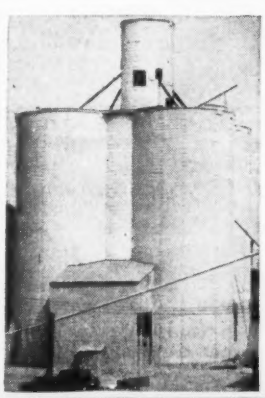
used available space— UP IN THE AIR!

When a company in northwestern Ohio needed more than the 65,000 bu. storage space they already had in eight Neff & Fry bins, they talked to us about more bins.

Adjacent ground could not be obtained for lateral expansion. So the alternative was to build *tall* bins. The four shown in the photo are 70′ high. They provide additional storage for almost 200,000 bu. of grain.

On top of the four big bins is a 16′ x 30′ machinery house, the roof of which is 100′ up in the air where space is always available—and free!



Maybe *room upwards* will solve your problem for handling and storing flowable bulk materials.

Be sure to read our interesting folder, "Bins with the Strength of Pillars." Write, wire, or phone for a copy.

THE NEFF & FRY CO.
214 Elm St. • Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS — NEFF & FRY

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No. 18 Heavy Duty Lathe will save you money on heavy patterns

The "Oliver" No. 18 Double-End Wood Lathe handles heavy as well as general work economically. Made in three capacities to swing 32″, 36″, 42″ over bed; 28″, 31″, 38″ over carriage. At outer end of head spindle it swings 88″, 92″, 98″. Turns 8′1″ between centers—bed can be made any desired length. Automatic feeding carriage. The No. 18 is used by leading engineering works. Write for details on our full line of Lathes.

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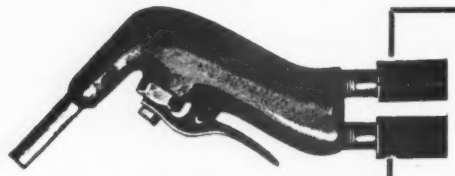
Eliminate—SWABS . . BRUSHES SPRAY CANS with the MURPHY PISTOL SPRAYER



OVER A MILLION SOLD TO DATE

The MURPHY PISTOL SPRAYER shoots blackening into hidden pockets beyond the reach of swabs. Jobs are completed faster and castings peel better and come cleaner. It is of great value in cleaning permanent molds, for aluminum and other metals as well as for sand blasting. For silica wash, oil, water or any liquid material and as a blow gun for cleaning parts and machinery. We guarantee this sprayer, designed by a practical foundryman . . . Write today!

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

HAMILTON SPRAY GUN

Complete with 4½ ft. suction hose and sinker . . . **$10.00 F.O.B.** Hamilton, O. *For spraying molds and cores with any liquid. For cleaning motors and machinery. For laying dust. Trigger control. Well made and guaranteed.*

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Moisture Elimination Up To 3000 Pounds Per Square Inch

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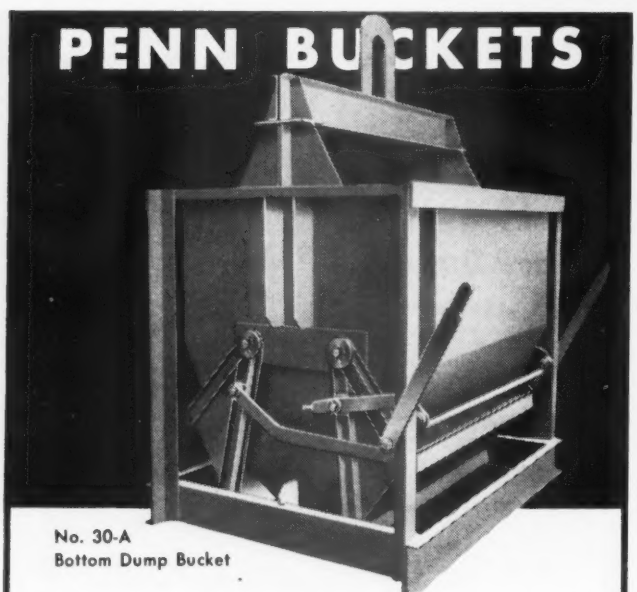

No. 30-A
Bottom Dump Bucket

Exclusive design makes this bottom dump bucket easy to operate . . . easy to open. Efficient for foundry use in handling all types of sand, moulding or core, dry or prepared. Can be used with coke, scrap iron and castings also. Sizes 7 to 200 cu. ft.

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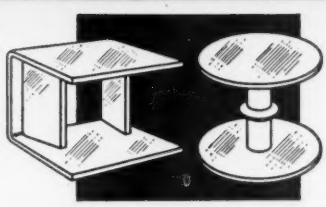
. . . extensive line, many patented and exclusive features.



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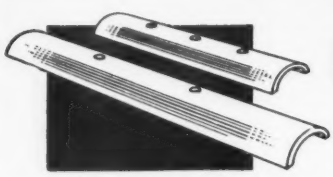

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. . . aluminum and Dowmetal

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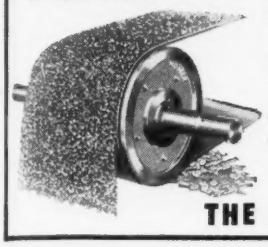
. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



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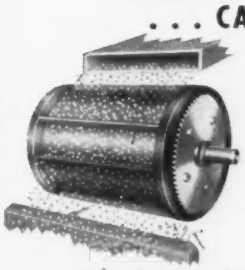

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Homer MAGNETIC PLATES — Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.

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SERVING YOU

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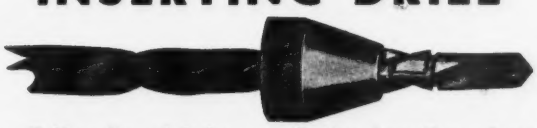

- **Uniformity of holes**
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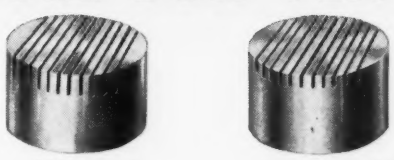

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Made of Tempered Steel, Easy to Use

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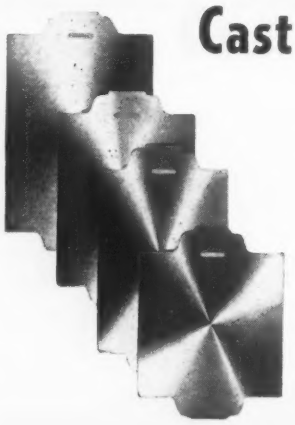

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THE ORIGINAL METALLIC FILLER FOR FERROUS CASTINGS

Just mix with water and apply cold. Sets quickly, and to all intents and purposes becomes part of the casting. Eliminates sand holes, blow holes and minor defects—just finish off with file or emery paper. Used by large and small foundries and machine shops . . . many imitators but only one Clark's Cast Steel Cement.

WRITE FOR LATEST FOLDER. Complete information as to use and uses; prices and free sample offer for testing.

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ANALYSIS OF CASTING DEFECTS

133 pages, illustrated
Price $4.25 Postpaid

To help foundrymen minimize and eliminate defective castings. Thirty-one basic casting defects are listed and described. Defects are defined simply and completely, illustrated by 101 figures collected from foundries of the United States and Canada.

THE PENTON PUBLISHING COMPANY
Book Department
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Model TMU-A—Height 44"; width 64"; weight 1200 lbs.

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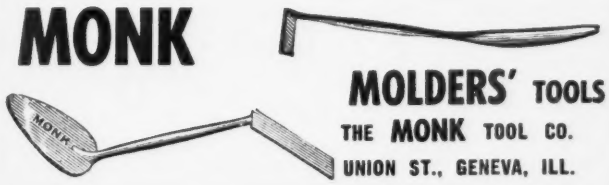

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A special metal has been developed for this star to guarantee a lower cleaning cost because of its resistance to abrasion.

Foundrymen using these stars say they outlast all other stars they have previously used.

Cut your cleaning costs by ordering a trial lot now

QUINCY FOUNDRY INC.
★ QUINCY, OHIO ★

WELLMAN *Williams Type*

NO BUCKET-OPENING SHOCK ON CRANE HOOKS

The Wellman "Hook-on", single-line bucket provides you with clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Both bucket and crane are protected against opening shock by a pair of adjustable snubbing sheaves. The snubbing action on the closing lines eliminates any shock when the bucket opens—an important feature since the operator cannot control opening speed of a single-line bucket.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

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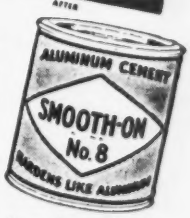
For Surface Blemishes in ALUMINUM CASTINGS

Have you used the Smooth-On Foundry Cement made especially to correct blow holes, porous and rough spots, dents and other unsightly but harmless surface defects in otherwise sound *aluminum* alloy castings?



Applied like the widely used Smooth-On *Iron* Foundry Cement, Smooth-On No. 8 *Aluminum* Cement fills in evenly, hardens quickly, matches perfectly. Stays in place, too, for it expands slightly as it sets.

Smooth-On No. 8 Aluminum Cement comes in 1- and 5-lb. sizes. 1 lb. will fill 17 cu. in. Order it by NAME AND NUMBER from your supply house. If they haven't it, write us. If you have not yet discovered Smooth-On No. 8, ask us for

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You'll receive also the famous 40-page SMOOTH-ON HANDBOOK, filled with industrial uses for the various Smooth-On Cements. 170 illustrations. Write today.

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Do it with **SMOOTH-ON**
No. 8 ALUMINUM CEMENT

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

HIGH SILICON IRON JISCO

A "blend" with JISCO is sound metallurgy.

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JACKSON, OHIO

PURO-SEAL FLUX

for producing **BETTER BRASS** *and* **ALUMINUM CASTINGS**

Write for Particulars and TRIAL SAMPLE

PURO SEAL — FOR THE PURIFICATION OF METALS

THE PURO-SEAL COMPANY
CLEVELAND 13, OHIO

WESTOVER ENGINEERS — COST CONTROL

Westover ENGINEERS

FOUNDRY MANAGEMENT CONSULTANTS
3110 WEST FOND DU LAC AVE., MILWAUKEE 10, WIS.
There is no better time than NOW to review incentives, methods, scheduling, production control and paperwork processes.

TUMBLING BARRELS

Roller Bearing throughout
Direct Motor Drive with Speed Reducer
V Belt Motor Drive—Tight & Loose Pulley Drive

ROYERSFORD FOUNDRY & MACHINE CO.
BOX F
ROYERSFORD, PA.

Dear Reader:

Your opinion expressed in answering the following questions will help us to serve you better. BIG things often result from little suggestions. May we have your comment? Thank you!

—FOUNDRY

Are YOU a Thumber?

- ☐ I start from the *front* and thumb through the issue until I find something of interest.
- ☐ No, I usually start from the *back* and work my way toward the front of the magazine.
- ☐ As a matter of fact, I consult your *Table of Contents* and start from there.

Are You One of Our Old-Timers?

- ☐ Yes, I've been a reader of FOUNDRY for _____ Years.

Where and How Do You Read FOUNDRY?

- ☐ I mostly read it at the office or plant.
- ☐ I read it at home.
- ☐ I receive my own personal copy.
- ☐ I read a copy passed along to me.

What Foundry Subjects or Problems Do You Like to See Discussed in FOUNDRY?

_____

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Name and Address (optional) _____

_____

Do you have some Favorites?

I usually read the regular departments checked:

- ☐ With the Editors column.
- ☐ Frank Steinebach's Editorial.
- ☐ Letters to the Editor.
- ☐ Around the Country.
- ☐ Foundry Group Activities.
- ☐ Industry Briefs.
- ☐ Late Foundry News insert.
- ☐ Men of Industry.
- ☐ Obituary.
- ☐ Statistics page.
- ☐ ABC of Foundry Practice.
- ☐ Adventures of Bill.
- ☐ Data Sheet.
- ☐ Foundry Developments.
- ☐ Man-To-Man.
- ☐ New Equipment Section.
- ☐ Questions and Answers.
- ☐ Classified Advertising.
- ☐ Ideas for Foundrymen.

** Thank You for participating in our opinion-poll. Please return to* **FOUNDRY**, *1213 W. 3rd St., Cleveland 13, O.*

CLASSIFIED ADVERTISING

Help Wanted

METALLURGIST

Wanted experienced in duplexing for malleable foundry to take full charge of melting, annealing and sand control. Only those whose qualifications will stand rigid check need reply—as the opportunity for advancement is a factor in accepting the right man. All replies confidential. Give complete background—especially last ten years, expected salary and when available.

BOX 772

FOUNDRY CLEVELAND 13, OHIO

STEEL FOUNDRY MEN

Opportunities for the following men in a large steel foundry:

Experienced Unit Foremen for
- Melted Metals Dept
- Foundry
- Core Room
- C.F.&A.
- Inspection
- Pattern

Also openings for engineers and draftsmen. Government owned defense plant in Chicago area to be operated on armor steel castings. Company operating set-up sufficiently large and aggressive to afford permanent opportunity to men whose performance proves to be outstanding.

BOX 742

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For shop producing 500 tons carbon and alloy steel, 300 tons electric iron and 150 tons brass pressure vessel castings per month. Must have broad and extensive experience in foundry operations, proven administrative ability, and good practical and technical background. Excellent opportunity with long established company of best reputation.

Reply in confidence giving full information as to age, background and experience as well as salary requirements. Address: Box 470, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

We need two men. One to act as General Superintendent in a gray iron jobbing shop specializing in large die and fixture castings. The other man in a similar capacity in a steel foundry. Both men must be experienced in administration, layout, scheduling, job setup and labor relations. Reply in confidence, giving age, experience and salary requirements. Address: Box 808, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST OR ENGINEER

Young metallurgist or engineer preferably with foundry experience for sales position with large chemical company. Sales and development work on the use of synthetic resins in the foundry will be prime responsibilities. Previous sales experience to the foundry industry desirable. Send compelte resume to: Box 748, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY FOREMAN

First class steel foundry foreman for heavy casting shop in Western Pennsylvania. Must be capable of designing patterns from blue prints, gating, heading and rigging for castings up to 200,000 pounds. Complete charge of all molding and coremaking operations. Address: Box 780, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Grey iron, Western Michigan — squeezer and light floor work. Must be ingenious, practical and production minded. Give experience, age, references and starting salary in reply. Address: Box 810, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

GENERAL FOUNDRY FOREMAN

Large aluminum foundry in Michigan has an opening for a General Foundry Foreman. The applicant must be experienced in all phases of aluminum sand foundry work, including the gating of patterns. Address: Box 764, FOUNDRY, Cleveland 13, Ohio.

EXPERIENCED FOUNDRYMAN

To handle cast iron boring, briquetting operation, manufacture and sales of briquettes and other foundry supplies. Address: 794, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

For a small brass production foundry in the Philadelphia, Pa. area. Experienced in metal alloying, centrifugal, permanent mold and synthetic sand processes. Address: Box 790, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN OR ASSISTANT

Gray iron foundry with capacity 40 to 50 tons daily, located Lower Michigan. Produces light and heavy castings on jobbing floors, squeezers and rockovers. Capable, aggressive man can have an unusual opportunity. Plant well equipped and company strong financially with many years successful operation. Age 40 or under. Address: Box 804, FOUNDRY, Cleveland 13, Ohio.

SUPERVISOR FOR MECHANIZED FOUNDRY

Old established eastern iron foundry completely mechanized running jobbing work of medium size requires supervisor thoroughly experienced in continuous pouring, multiple conveyor operation. Squeezer, stripper and rollover machines, high production. Excellent opportunity for man who is a leader. Reply giving age and experience. Address: Box 792, FOUNDRY, Cleveland 13, Ohio.

WANTED

Man to take complete charge of all operations in the Steel Foundry Department of a large foundry. Opportunity for advancement with long established company. Write stating full qualifications and experience. All replies held confidential. Address: PERSONNEL MANAGER, THE EASTERN MALLEABLE IRON COMPANY, P.O. BOX 349, WILMINGTON 99, DELAWARE.

FOUNDRY SUPERINTENDENT

For plant pouring approximately 25 tons per day, about one half jobbing and balance semi production ranging in weight from 1 oz. to 2000 lbs. We believe this is an excellent opportunity for a really good foundryman who knows his busines: and who has the ability to maintain good employee relations. When replying please detail your foundry experience, metallurgist experience, if any, age, marital status and salary desired. Replies will be kept strictly confidential. Address: Box 789, FOUNDRY, Cleveland 13, Ohio.

DIE CAST DIE DESIGNER OR PERMANENT MOLD DESIGNER

Light metals experience required. This is a permanent job with unlimited future for qualified man. Position is in modern midwest foundry facility now undergoing expansion. Salary commensurate with ability. Bonus plan. Send complete resume. Address: Box 499, FOUNDRY, Cleveland 13, Ohio.

CLEANING ROOM SUPERVISOR

Pacific coast foundry producing steel and iron castings. Excellent opportunity for experienced person. Position permanent. Answer giving experience, age, reference, expected salary and other information in first letter. Address: Box 778, FOUNDRY, Cleveland 13, Ohio.

TIME STUDY MAN

Experienced in nonferrous foundry. In reply state qualifications, age and salary. Address: Box 777, FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

With metallurgical, ceramic or foundry experience. Young man anxious for responsible position. Unlimited potential earning opportunities. Address: Box 803, FOUNDRY, Cleveland 13, Ohio.

EXPERIENCED STEEL FOUNDRYMAN

Opportunity for an experienced man to stabilize and help guide a young, aggressive steel foundry organization. Should have experience in melting, molding, core making and cleaning and should be capable of smoothing out rough spots in any phase of foundry work. Age not important. Address: Box 795, FOUNDRY, Cleveland 13, Ohio.

LINE FOREMAN

To take charge of production line making miscellaneous squeezer and cope and drag work in medium sized mechanized foundry. Unusually good opportunity for right man. Must be experienced. Give references. Address: Box 774, FOUNDRY, Cleveland 13, Ohio.

JOB CASTING FOREMAN

Foreman for floor job castings department running work up to 4000 lbs. Experience essential. Capable of training men. Give background, references and requirements. Address: Box 775, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

With steel foundry experience or one presently an assistant who feels he can handle a 300 man production plant. Location Northern Ohio. Give full details in first letter including salary expected. Address: Box 735, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

Age 35 to 45, aggressive, well balanced and who really knows his job for medium size gray iron foundry on light to medium heavy castings. Central New York, good opportunity for advancement to right man. Address: Box 801, FOUNDRY, Cleveland 13, Ohio.

Representative Wanted

REPRESENTATIVES WANTED

To handle nationally known revolutionary heat treating and metal melting furnaces; proven to be most efficient, economical and rapid. Applicants must have many years personal contact with heat treaters and foundries; engineering and metallurgical knowledge preferable. All communications will be treated strictly confidential. Only applicants having necessary qualifications will be considered. Territories open east of Chicago only.

STANDARD AMERICAN ENGINEERING CO.
7853 WEST 43rd ST. LYONS, ILL.

Positions Wanted

FOUNDRY SUPERINTENDENT

Age 43. 25 years' practical experience ferrous and nonferrous. Fully qualified to take complete charge all foundry operations. Iron by analysis, high and low carbons. General jobbing preferred. Have held supervisory positions past 15 years, last ten as superintendent. Now employed. Complete data education and experience upon request. N. Y. State preferred but not essential. Address: Box 784, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Experienced in gray iron, brass, steel and malleable. Graduate metallurgist with experience in all branches of the foundry. Have held executive position and desirous of position with progressive company. 39 years old. Address: Box 781, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Looking ahead? So am I. Good man for good company. Record—I make profits. Experience—25 years' practical, technical, administrative. Age 42, now employed. Address: 797, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Positions Wanted

EXECUTIVE POSITION

Desired by young family man. Sound scholastical and practical background. Working knowledge of economics, production, sales and human relations. Experienced in molding, melting, sand and laboratory in both worker and supervisory capacity. Previously technical advisor and now sales representative for large midwest foundry. Interested in managing a medium sized foundry or Jr. executive in large corporation. Must give 30 days' notice. Address: Box 786, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

To take complete charge of small or medium size foundry. Qualified in all phases of foundry operations—gray iron, nonferrous, jobbing or production. Mid West preferred. Address: Box 791, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY PATTERN SUPERVISOR

Experienced in steel, malleable and grey iron. Pattern layout, gating and casting layout. Molding, coremaking and core blowing supervision. Sales ability. Prefer California or Southwest. Address: Box 806, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Fifteen years' experience cupola, electric furnace. Any kind of iron melted with close control at lowest cost. Versed in chemical and physical testing. Address: Box 773, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as superintendent or general foreman gray iron, ductile iron or nonferrous. Practical man with 27 years' jobbing and production. New York State preferred but not essential. Address: Box 785, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

A top notch foundryman with twenty-one years' experience in all phases of foundry work. Desires position as manager or superintendent in medium to large company, jobbing or production, alloy, semi-steel and gray iron. Now employed, available on short notice. Address: Box 726, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR SUPERINTENDENT

Experienced in gray iron and some nonferrous on both production or jobbing basis. Exceptional background of practical and technical training Cost minded and have the best in references. Eighteen years of executive background. Address: Box 707, FOUNDRY, Cleveland 13, Ohio.

MANAGER—ASSISTANT TO PRESIDENT

Steel, iron, brass. Thoroughly experienced in every shop operation, metallurgy, engineering accounting and management. Excellent ability to develop a superior organization by leading teaching and example. Outstanding reputation for keen analysis, sound judgment and a rare combination of practical experience, managerial ability and effective personality. Address: Box 375, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

Wood and metal work—also plastic. Experience about 40 years. Capable of running shop or working foreman or bench. First class mechanic. Match plate work and precision castings. Can run shop or set up new pressure cast shop for pattern work and precision castings. Address: Box 770, FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL ENGINEER

Capable steel foundry metallurgist desires position. Experienced, finest references, outstanding background. Now employed, M.S. degree. Address: Box 798, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Twenty-three years' practical operations greendry sand. Molder and coremaker, metallurgy sand control, jobbing or production. Cost and scrap minded. Assume full charge. Aluminum or malleable preferred. Employed, desire change. Age 42. Address: Box 800, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Position wanted with a large company that controls several nonferrous metal foundries. Person applying possess a practical background as well as technical control over most any situation that he may be confronted with including plant layout and operation of coreroom, foundry and cleaning departments. References will be given upon personal contact with any company who is interested. Address: Box 783, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

METALLURGICAL SUPERVISOR

Supervisory experience in melting and molding in malleable iron, steel, grey iron and nonferrous foundries, with emphasis on production and employee supervision. Metallurgical degree. Eastern Pennsylvania preferred. Address: Box 788, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

CAPABLE ON "SAND" IN SALES OR SERVICE

Qualified in working sand or its related additions, into any type foundry on a production basis. Experience covers seven years as a sand technician in top notch foundries. In addition, served three years in sales service on "sand" in foundries throughout the country. Address: Box 787, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

25 years' experience in steel, iron and malleable. Technical and practical experience. Excellent managerial ability. Address: Box 793, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY MANAGER

Twenty-nine years of steel foundry, electric and open hearth experience. Unusually well versed in all phases of operations. Now empoyed. Address: Box 799, FOUNDRY, Cleveland 13, Ohio.

FOREMAN OR SUPERINTENDENT

Practical gray iron foundryman molder by trade experienced in general jobbing and quality semi steel and alloyed castings. Well versed in green—dry and pit work. Well experienced in cupola practice, bumper and squeezer work. Available about April 1st. Address: Box 807, FOUNDRY, Cleveland 13, Ohio.

Available Capacity

AVAILABLE CAPACITY

We have available capacity for aluminum sand castings either pressure or nonpressure. Loose or plate patterns.

HOOTMAN ALUMINUM FOUNDRY

BRYAN **OHIO**

CAPACITY AVAILABLE

BRASS, BRONZE, ALUMINUM—ounces to 25 pounds.
GRAY IRON—ounces to 200 pounds.

Modern mechanized foundries. Machining, polishing, electroplating, assembling. Pattern shops to serve our customers. Inquiries solicited. Send blueprints or samples for prompt quotations.

DICK BROTHERS, INC.

354 NORTH 3rd STREET **READING, PA.**

IMMEDIATE CAPACITY AVAILABLE

For semi-steel castings, pressure type as well as usual run of work. Quantity runs of 100-500 lbs. castings. Jobbing lots of castings 500 to 10,000 lbs. Address: DARLING VALVE & MFG. CO., WILLIAMSPORT, PA.

GRAY IRON FOUNDRY AVAILABLE CAPACITY

We have open capacity in two foundries enabling us to supply both light and medium heavy gray iron castings of high quality. One is a highly mechanized, high speed production foundry capable of producing large volumes of light and medium castings and the other produces castings up to 1000 pounds. Address: Burnham Corporation, Zanesville, Ohio.

AVAILABLE CAPACITY

Patterns and driers, complete shop service. Located near Detroit. Prompt delivery on first class work. Address: Box 698, FOUNDRY, Cleveland 13, Ohio.

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

AVAILABLE CAPACITY

We have open capacity in gray iron on squeezer, cope and drag, floor, crane and odds and ends. Address: PHARISBURG FOUNDRY CO., MARYSVILLE, OHIO. R. 1.

Foundries For Sale

FOUNDRY—GRAY IRON

Brick and steel foundry with two clear spaces 80 x 320 ft. with overhead monorail, story height 13 ft. 6 in., gable 23 ft., attached building 40 x 50 ft., story height 15 ft. 6 in. and 13 ft. 4 in., has two No. 7 Whiting cupolas 72 in. in diameter. Contains equipment, ideal for mechanized operation, plenty dumping ground, built 1917, composition roof, vicinity population about 9000, near center of U. S. population, expect natural gas this year, served by two major railroads, water transportation available, city hydrant fire protection, land for expansion. Subject to withdrawal without notice. Address: Box 358, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Small New Jersey nonferrous ornamental and pattern foundry, wide variety steel and iron flasks, 2 pit & 1 tilting gas furnaces, Simpson mixer, 2 brick ovens, 3 ton manual traveling crane 19' span 58' runway, steam heat. Retiring. Address: Box 745, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Modern nonferrous foundry, sand system, 6 molding positions, 5 core making, 5 tilting furnaces. Good accounts, sales $274,000 1950. Can be raised to $500,000. Price $65,000. Will give lease on building 60 x 150 ft. to suit buyer with option to buy. Principals only. San Francisco, California Bay district. Contact owner, Box 809, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Well equipped gray iron foundry and machine shop in the center of North Dakota's oil boom. One of the greatest opportunities in the North West. Under the same management for fifteen years. Reason for selling—ill health. Call or write: MINOT FOUNDRY CO., MINOT, NORTH DAKOTA.

MODERN FOUNDRY FOR SALE

Bricks and cement blocks foundry, built 1948. Well equipped, main building 80 x 120, one #3 Whiting cupola with automatic charger. Near industrial city on highway, immediate possession. Terms can be arranged. Address: TROTTIER INC., LA PERADE CO., CHAMPLAIN PROV., QUEBEC, CANADA.

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR SALE

Established going grey iron foundry fully equipped. Power squeezer and small floor work. Buildings and land—price $45,000. Located in Wisconsin, town population 10,000. Address: Box 796, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOR SALE

GREY IRON FOUNDRY AND MACHINE SHOP May be purchased separately or together. Foundry has 10,000 sq. ft. of space, is fully equipped and operating; machine shop suitable as production factory has 4,000 sq. ft. space. Located in rural community in Western Illinois where labor and materials are ample. Wonderful opportunity.

BOX 778

FOUNDRY CLEVELAND 13, OHIO

Wanted-To-Buy

WANTED TO BUY

Steel Apron Conveyor for hot castings, 18", 20", 24" or 30" wide.
Pottstown Tapping Machixes.
2—16" Cyl. Jolt Squeeze Stripper Molding Machines
1—14" Cyl. Rollover Molding Machine
STEEL FLASK EQUIPMENT
18—14 x 16 6" Drag 4" Cope
18—12 x 18 6" Drag 4" Cope
24—12 x 23 6" Drag 4" Cope
18—14 x 20 7" Drag 7" Cope
12—16 x 16 6" Drag 6" Cope
12—18 x 18 6" Drag 9" Cope
24—18 x 18 6" Drag 6" Cope
24—24 x 24 7" Drag 7" Cope
18—16 x 26 6" Drag 6" Cope
12—30 x 30 5" Drag 7" Cope

NATIONAL FOUNDRY COMPANY OF NEW YORK, INC.
2-56 SANDFORD ST. BROOKLYN 5, NEW YORK

INDUCTION MELTING UNIT

For melting steel. Ajax spark gap converter preferred. Or high frequency motor generator set. Address: MILTON J. DAVIDSON, 10853 WILSHIRE BLVD., LOS ANGELES 24, CALIF.

WANTED

Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY
765 PENOBSCOT BLDG. DETROIT 26, MICH.
WOODWARD 1-1894

WANTED

Fabricated steel flasks—every size from 16 x 16 up. Must be in excellent condition and reasonably priced. ADDRESS: MARCH-BROWNBACK CO., INC., POTTSTOWN, PA.

CUPOLA WANTED

#3 or 3½ cupola (46 or 51 inch shell). Must be good design and in good condition. Also need charger for above. Address: MIDLAND IRON WORKS, MIDLAND, MICHIGAN.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

Rotary table feeder and paddle mixer or pug mill. Address: CHESANING PIPE CO., CHESANING, MICHIGAN.

WANTED

Detroit rocking electric furnace, complete type LFY 700# nominal cold charge. Address: Box 805, FOUNDRY, Cleveland 13, Ohio.

WANTED

One used screenerator and one mullbarrow, used. Address: GRUBBS FOUNDRY, 4700 ROSA ST., EL PASO, TEXAS.

WANTED

Number 2 Simpson Mill. Advise price, condition and where same can be inspected. Address: W. E. MACMULLAN, WELLSVILLE, MO.

WANTED

Herman rollover jolt and draw molding machine, 3000 lb.—15" cylinder with 40" x 56" or slightly larger table. State age, condition and price.

BOX 779

FOUNDRY CLEVELAND 13, OHIO

WANTED

SANDSLINGER WANTED—Junior Tractor. Address Box 656 FOUNDRY, Cleveland 13, Ohio

WANTED TO BUY

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2—Gyratory Elec. Riddles
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1—Royer Jr. Sand Conditioner
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1—#405 Osborn Rollover and Pattern Draw Molding Machine
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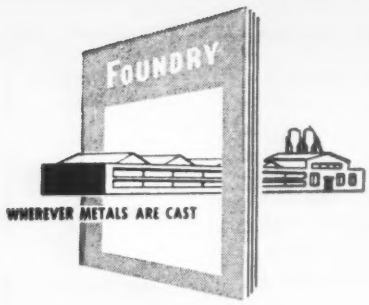

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FOUNDRY
PRE-CONVENTION ISSUE

MAY 1952

Mailed to reach foundrymen one week prior to opening of the 1952 Convention. This issue will also be distributed at the Convention.

ADVERTISING FORMS CLOSE MARCH 25, 1952

FOUNDRY
POST-CONVENTION ISSUE

JUNE 1952

Will report in word and picture the convention itself —always an interesting, readable issue.

ADVERTISING FORMS CLOSE MAY 1, 1952

Dear Reader:

PENTON BUILDING
CLEVELAND 13, OHIO

Your opinions as expressed to us on the questionnaire which occupied this space for the past two months have been most interesting and *helpful*. Thank you for the fine cooperation always characteristic of foundrymen!

One thoughtful reader illustrated his suggestion for more editorial material on "practical slants" with a readable discussion of a common foundry problem . . . . so well, in fact that it will appear in the editorial section of an early issue of FOUNDRY.

Why don't YOU write something for us? While it will be a long time before *we* achieve editorial stature, the Business Staff manages to hold a little influence upstairs by plugging away at this column from month to month—and the chances are GOOD that if you will write for us on your favorite foundry subject, we'll use our connections to have it published.

Think it over and look at it this way: You must have your own angle on many every-day foundry problems which would make interesting and useful reading to other foundrymen. Why not obey that impulse and write it down with any rough sketches which illustrate your point? Don't worry about polishing up your words and phrases. The editors will take care of that if necessary. A chance to give wide-spread publication to your particular know-how, to benefit your fellow foundryman, have your good name in print and be rewarded with a "dollar or two."

THANKS TO:

George M. Muntz

Yes, FOUNDRY readers are nice people! Not only because 80% of them like what they receive each month well enough to renew their subscriptions at expiration but because they often go out of their ways to perform a friendly favor . . . . . as did reader George M. Muntz recently when we ran a paragraph addressed in Spanish to our readers who speak that language. President of the Tropenas Co., New York City and Resident Director of Sambre et Meuse steel foundries, Reader Muntz rendered our message in French which we publish for our readers who speak *that* language.

Salutations à nos nombreux lecteurs-fondeurs des pays de langue française.

Depuis de nombreuses années, nous essayons de rendre service aux fondeurs du monde entier, mais, comme il n'est pas possible de publier notre revue dans toutes les langues, et ne pouvant vous envoyer FOUNDRY en français, nous avons décidé de vous adresser quelques mots en votre propre langue.

Vous qui lisez ces lignes, aurez peut-être la bonté de nous écrire aù sujet des bénéfices que vous tirez de FOUNDRY.

Nous aimerions également vous voir partager avec nous, et vos problêmes, et tout ce que vous croiriez susceptible d'intéresser nos lecteurs américains.

Nous venons de publier, en anglais, une nomenclature de 32 pages des expressions les plus usitées en fonderie, intitulée Glossary of Foundry Terms. Si la chose vous intéresse, nous aurons grand plaisir à vous en envoyer un exemplaire gratuit, sur demande.

Ideas for Foundrymen—requests for editorial reprints offered in this new FOUNDRY feature have exceeded all expectations, with the result that we have quickly exhausted the supply of certain articles. These will be replaced eventually with other reprints on similar subjects, so try us again, won't you?

Cordially yours,

Geo. Dogle

Business Manager
FOUNDRY

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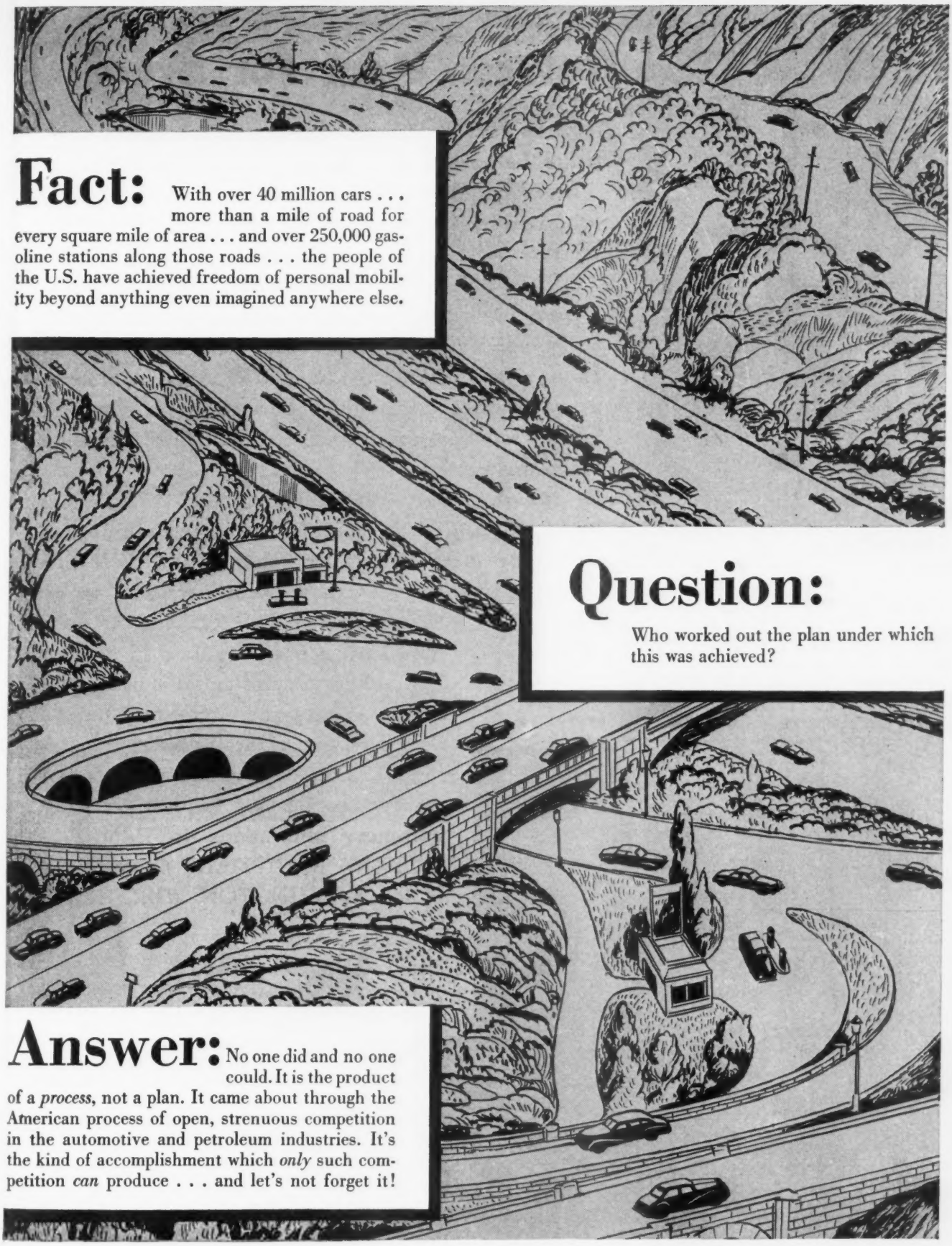

Fact: With over 40 million cars . . . more than a mile of road for every square mile of area . . . and over 250,000 gasoline stations along those roads . . . the people of the U.S. have achieved freedom of personal mobility beyond anything even imagined anywhere else.

Question:

Who worked out the plan under which this was achieved?

Answer: No one did and no one could. It is the product of a *process*, not a plan. It came about through the American process of open, strenuous competition in the automotive and petroleum industries. It's the kind of accomplishment which *only* such competition *can* produce . . . and let's not forget it!

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The competitive system delivers the most to the greatest number of people

A 3" POT FOR BRASS...
and this 6-Ton Bottom Pour for Steel..

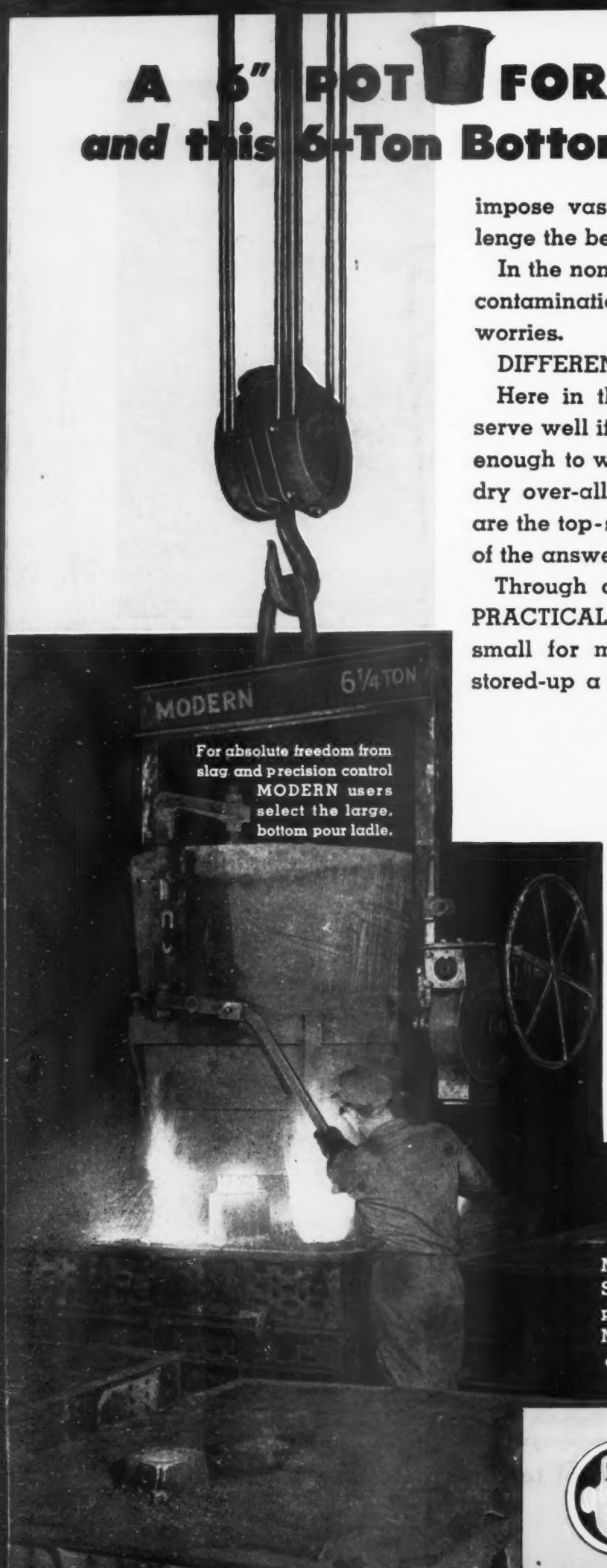
impose vastly different pouring problems to challenge the best in specialized, foundry engineering...

In the non-ferrous foundry, lining to prevent metal contamination is one of the superintendent's top worries.

DIFFERENT is the making of steel castings.

Here in the steel foundry almost any lining will serve well if contour is right and if the lining is thick enough to withstand the heat. BUT in the steel foundry over-all ladle balance and speed in slagging are the top-spot considerations. MODERN has some of the answers:

Through closely WORKING TOGETHER WITH PRACTICAL FOUNDRYMEN, in foundries large and small for more than thirty years, MODERN has stored-up a wealth of over-all professional, foundry "know-how!" It's FREE for the asking: Ladles are described in catalog 149...chargers and cupolas in catalog 147-A...cranes and monorail 150...and Pouring Devices are covered in catalog 147. Foundry superintendents can reserve copies by writing on their company letterheads to Dept. F-3, MODERN EQUIPMENT COMPANY, PORT WASHINGTON, WISCONSIN.



For absolute freedom from slag and precision control MODERN users select the large, bottom pour ladle.

Modern 58" bottom pour ladle at Maynard Electric Steel Casting Company, Milwaukee, is helping to pour 100 tons of steel in a 'round-the-clock operation. Molds poured here take from 2000 to 12,000 pounds of steel, each, for excavator carbodies.

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. . . a little goes a long way

. . . has become a phenomenal "best-seller" because of its enthusiastic and wholehearted acceptance by foundrymen everywhere.

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This thin, transparent liquid can be sprayed, swabbed or brushed on patterns or matchplates to form a tough surface film that guarantees clean parting and smooth molds.

It's economical, too — 20 to 60 molds per application lowers costs and proves a little goes a long way! Call your Stevens representative today or write direct.

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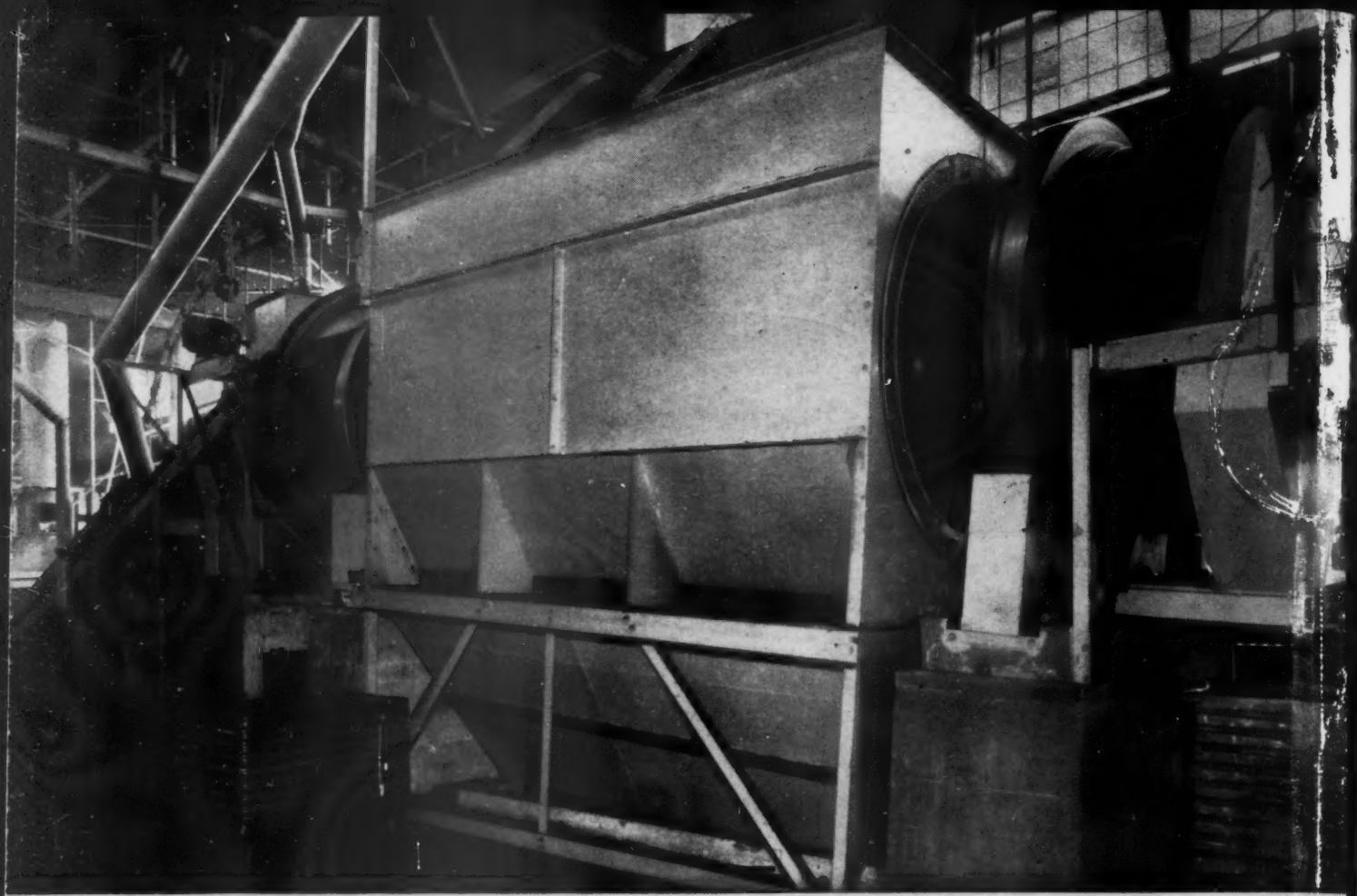
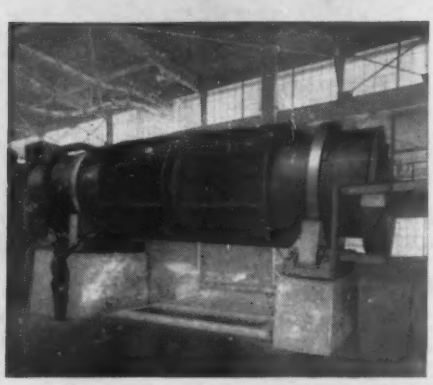
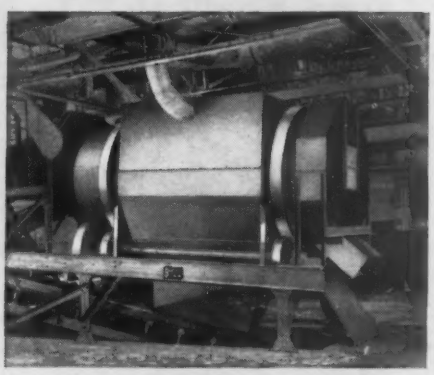


Above: 72" dia. by 28' Rotary Screen in large Southern Foundry, showing Dust Hood and Discharge Chute.



Same Screen as above; Dust Hood and Discharge Chute Removed.



Rotary Cooling Screen with Dust Hood in large Detroit Foundry.

Cool Sand

improves production

● Bartlett-Snow Rotary Cooling Screens, like the one pictured above, lower the temperature of hot shakeout sand from 25° to 50° F. preparatory to storage and mulling. They break up the lumps and remove the rods, gaggers and other metal, so that only clean, cooled, screened sand is passed into the elevating, storage and mulling equipment.

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